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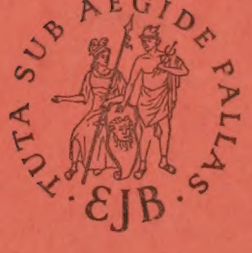

LEIDEN
E. J. BRILL

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Superfamily PASIPHÆOIDA Borr.

Family Pasiphæidae.

The family Pasiphæidae includes at present seven genera: *Pasiphæa* Sav., *Parapasiphaë* S. I. Smith, *Dantecia* Caullery, *Sympasiphæa* Alcock, *Orphania* Bate, *Psathyrocaris* W.-Mas. and *Leptochela* Stimps. *Pasiphæa* Sav. is a cosmopolitan genus, the 26 species having been observed in all seas of the world. Of the 6 species of *Parapasiphaë* two occur in the Andaman and Arabian respectively Laccadive Sea, one occurs off the west coast of California, while the three remaining species are found on the east coast of the United States and in the North Atlantic, one of the latter even at Cape Point. The 5 representatives of the genus *Psathyrocaris* are all indopacific, excepting the variety *atlantica* Caull. of *Psath. fragilis*, which variety inhabits the Gulf of Gascony. Of the 7 species of *Leptochela* two are found in the West Indies, while the rest are distributed throughout the Indopacific. The three last genera *Dantecia*, *Sympasiphæa* and *Orphania* are represented each by one species, found respectively in the Gulf of Gascony, the Arabian Sea and south-east of New York.

The species, collected by the "Siboga", belong to the genera *Pasiphæa*, *Psathyrocaris* and *Leptochela*. Of the genus *Leptochela* not only a nice new form was discovered, but of the other species, *Lept. robusta* Stimps., no less than 86 specimens were taken, of which 61, collected north of Waigeu-island, are adult, so that I was enabled to contribute rather largely to the knowledge of this interesting animal, that hitherto was rather insufficient. Of the genus *Pasiphæa* Sav. 5 species were captured, unfortunately, however, 3 are represented by a single young specimen, so that it proved impossible to determine them with certainty: the single specimen of *Psathyrocaris* is rather much mutilated.

LIST OF ALL THE SPECIES OF PASIPHÆIDAE, KNOWN AT PRESENT.

I. Genus **Pasiphæa** Sav. 1816.

SPECIES	HABITAT	DEPTH IN FATHOMS
acutifrons Bate 1888.	Off Port Churruca, Patagonia	245
	South of Japan	775

SPECIES	HABITAT	DEPTH IN FATHOMS
acutifrons Doflein and Balss 1912 [1]	Punta Arenas	
affinis Rathb. 1902	Near Cortez Bank, Calif.	984
Alcocki W.-Mas. 1891	Bay of Bengal	922
	Gulf of Manár	406
	Arabian Sea, off the Sind coast	947
americana Faxon 1893	Gulf of Panama	259, 286
	Galapagos Islands	384, 551
amplidens Bate 1888	Sagami Bay, Japan	775
corteziana Rathb. 1902	Near Cortez Bank, Calif.	776
cristata Bate 1888	Off Matuku, Fiji Islands	315
emarginata Rathb. 1902	Santa Barbara Channel, Calif.	265 to 322
	Gulf of California	857
Faxoni Rathb. 1902	Galapagos Islands	384—551
flagellata Rathb. 1906	Hawaiian Islands	295, 362 to 399 and 411 to 442
forceps A. M.-Edw. 1891	Straits of Magellan	177
kaiwiensis Rathb. 1906	Hawaiian Islands	343—337
	Bali Sea	294
longispina Lenz 1914	Southern Indian Ocean at 65° 15′ S., 80° 19′ E.	
	South Pacific at 71° 41′ S., 166° 47′ W.	0—956, Plankton
magna Faxon 1893	Gulf of Panama	458
magna Rathb. 1904 [2]	From off Point Arena to off Point Sur, Calif.	276—552
multidentata Esmark 1865	East coast of the United States	This species lives nearer towards the surface than *Pas. tarda* Kröyer and *Pas. principalis* Sund.
	Off the Irish coast	
	South of the Faerøes	
	On Tampen Bank in the North Sea	
	Skagerack	
	Norwegian fjords up to Malangen	
pacifica Rathb. 1902	From Unalaska and the Gulf of Alaska southward to the Gulf of California	53—399
	Cape Natal	440
princeps S. I. Smith 1884	East coast of the United States from 39° 56′ N., 69° 45′ W. to 32° 27′ 30″ N., 77° 20′ 30″ W.	349—1342
	North of Unalaska, Bering Sea	399
	Off Sea Lion Rock, Washington	859
	Off Ecuador	1132
principalis Sund 1912	North side of the Bay of Biscay	246
	South-west of Ireland	504
	South of the Wyville Thomson ridge	
	West coast of Norway to Andenes	137—410
	South of the Faerøes	191—601
	East of Labrador	540—765

1) The specimens from Punta Arenas, referred by DOFLEIN and BALSS to *Pas. acutifrons* Bate, (in: Mitteil. aus dem Naturh. Museum XXIX. Hamburg, 1912, p. 26), differ from BATE's description by the extremity of the telson being truncate, not forked, and will perhaps prove to belong to *Pas. Faxoni* Rathb.

2) According to Miss RATHBUN, in: Decap. Crust. of the northwest coast of North America, New York 1904, p. 19, the dentification of the specimens, dredged by the "Albatross" at this locality, with *Pasiphæa magna* Faxon is doubtful.

SPECIES	HABITAT	DEPTH IN FATHOMS
propinqua de Man 1916	Near the Sulu Islands	245
Rathbunae Stebb. 1914	Southern Atlantic at 48° 0′ S., 9° 50′ W.	1332
Scotiae Stebb. 1914	71° 22′ S., 16° 34′ W.	1410
	68° 32′ S., 12° 49′ W.	From surface to 600
sicula Riggio 1896	Sicily	
Sivado (Risso) 1816	West, south and east coast of Norway	109
	West of Scotland (Loch Fyne, Loch Etive, Loch Aber, Loch Linnhe, Loch Carron)	50—100
	Off the west and south coast of Ireland	110—480
	Bay of Biscay	240—412, surface
	West coast of Spain and Portugal	
	Mediterranean (Nizza, Genua, Corsica, Sardinia, Gulf of Naples, Messina, Coast of Greece)	
	Southern Adriatic	From surface to 546
	Red Sea	355—500
	Andaman Sea	200
	Bay of Bengal	200—350
	Japan	
tarda Kröyer 1845	Skagerack	82—281
	South of Jan Mayen	371
	North of east Iceland	293
	West and south-west of Iceland	450, 485
	South-east of Greenland	
	West coast of Greenland	458—765
	Davis Straits	420—460
	South-west of Ireland	
truncata Rathb. 1906	Hawaiian Islands	293 to 800
unispinosa W.-Mas. 1893	Andaman Sea	265, 405
	Bay of Bengal	200—350
	Arabian Sea	360, 609—620
sp. de Man 1916	Halmaheira Sea	Plankton
sp. de Man 1916	Off Sulu-island	150
n. sp.? de Man 1916	Between Batjan and the Obi Islands	From 820 to surface

II. Genus **Parapasiphaë** S. I. Smith 1884.

compta S. I. Smith 1884	East coast of the United States:	
	at 38° 19′ 26″ N., 68° 20′ 20″ W. and	2369
	at 39° 03′ 15″ N., 70° 50′ 45″ W.	1537
cristata S. I. Smith 1884	East coast of the United States, at 39° 22′ N., 68° 34′ 30″ W.	1628
Gilesii W.-Mas. 1893	Andaman Sea	650
	Arabian Sea	696
latirostris W.-Mas. 1891	Laccadive Sea	595—556, 696, 740
serrata Rathb. 1902	Off Cortez Bank, Calif.	984

SPECIES	HABITAT	DEPTH IN FATHOMS
sulcatifrons S. I. Smith 1884	East coast of the United States from between lat. 35° 12′ 10″ and 41° 53′ N. and long. 65° 21′ 50″ and 74° 57′ 15″ W.	516—2949
	West coast of Greenland	569—1093
	West of Iceland	1236
	South of Iceland	1180
	North Atlantic, at lat. 52° 33 N., long. 26° 44′ W.	
	Off the west coast of Ireland	550—800
	Cape Point (Cape Colony)	660
III. Genus **Dantecia** Caull. 1896.		
Caudani Caull. 1896	Gulf of Gascony	934
IV. **Sympasiphæa** Alcock 1901.		
annectens Alcock 1901	Arabian Sea	487
V. Genus **Orphania** Bate 1888.		
tenuimana Bate 1888	South-east of New York	1240
VI. Genus **Psathyrocaris** W.-Mas. 1893.		
fragilis W.-Mas. 1893	Bay of Bengal	240, 609
	Arabian Sea	172, 609—620
	Off the south-coast of Muna Island	1030
fragilis W.-Mas. 1893 var. *atlantica* Caull. 1896	Gulf of Gascony	437
hawaiiensis Rathb. 1906	Hawaiian Islands	876
infirma W.-Mas. 1894	Andaman Sea	405
platyophthalmus Alcock & Anderson 1894	Bay of Bengal	409
	Arabian Sea	705
plumosa Alcock & Anderson 1894	Arabian Sea	902
VII. Genus **Leptochela** Stimps. 1860.		
aculeocaudata Paulson 1875 [1])	Red Sea	
	Djibouti	
carinata Ortm. 1893	Off the mouth of the Tocantins, Brazil	27—54
	Off Porto Rico	6—15
	Gulf of Mexico	19
	Bahamas	

1) According to Dr. BALSS identical with *Leptochela robusta* Stimps.

SPECIES	HABITAT	DEPTH IN FATHOMS
gracilis Stimps. 1860	Kagoshima Bay, Japan	In deep water
	Off Japan	50
	West coast of Korea	
pugnax de Man 1916	Bay of Bima	30
	Off the Kei-islands	12, 15
robusta Stimps. 1860	Hawaiian Islands	Surface
	China Sea	20
	Loo Choo Islands	
	Ternate	
	Sulu-archipelago	7
	Kwandang-bay-entrance	41
	Off Waigeu-island	77
	Between islands of Wowoni and Buton	From 41—51
	South coast of Timor	18, reef
	Saleh-bay	Up to 20
	Haddumati Atoll, Maldive Islands	
	Northern part of the Red Sea	
robusta Bate 1888	Off East Moncoeur Island, Bass Strait	38
serratorbita Bate 1888	Virgin Islands	
	Off Porto Rico	15
	Key West	Surface

Pasiphæa Sav.

The genus *Pasiphæa* Sav., with which WOOD-MASON's genus *Phye* is united, because in my opinion it should hardly be regarded as a subgenus, includes at present nearly 26 species. The first described, *Pas. Sivado* (Risso), is the most widely distributed of all. This *Pasiphæa*, indeed, is well known in the Mediterranean from Nizza and Genua to the coasts of Greece and in the Southern Adriatic, it is rather common off the Portuguese coast and in the Bay of Biscay, but has not yet been observed in the English Channel and North Sea. It is found, on the contrary, in the Bristol Channel, in the Irish Sea, off the west coast of Scotland and Ireland, while it has been taken also, though rarely, off the south and west coasts of Norway. This species, however, occurs moreover in the Red Sea, the Bay of Bengal and the Andaman Sea and has even been dredged off the coasts of Japan [1]). *Pas. sicula* Riggio is the second species that inhabits the Mediterranean. Still three other species are found on the west coast of Europe. *Pas. principalis*, which has always been confounded with *Pas. tarda*, until it was distinguished by OSCAR SUND in 1912 as a proper species, has been observed at the north side of the Bay of Biscay, off the south-west of Ireland, south of the Wyville Thomson ridge and off the west coast of Norway to Andenes; it occurs also south of the Faeroes and has even been captured by the "Tjalfe" east of Labrador. *Pas. tarda* Kröyer occurs in the seas around Greenland and Iceland, has been observed in the Skagerack and seems to occur also

1) On this occasion I wish to call attention to the fact that an exhaustive description of *Pasiphæa Sivado* (Risso) has not yet been published, as far as I am aware, the descriptions, known to me, being all more or less incomplete.

south-west of Ireland. The third species, finally, *Pas. multidentata* Esmark, is found in the Norwegian fjords up to Malangen near Tromsø, in the Skagerack, on Tampen bank in the North Sea, south of the Faeroes and off the east coast of the United States. Still another species occurs on the east coast of the United States, viz. *Pas. princeps* S. I. Smith, a form which is, however, also recorded from the Bering Sea, from off the coast of Washington and that of Ecuador. *Pas. Rathbunae* Stebb. has been observed in the Southern Atlantic at lat. 48° 00′ S., long. 9° 50′ W., while *Pas. Scotiae* Stebb. is only known from the Weddell Sea. A remarkable distribution shows *Pas. acutifrons* Bate, which has been recorded not only from off Port Churruca, Patagonia, but also from off south of Japan. Two other species occur in the Straits of Magellan, *Pas. forceps* A. M.-Edw. and a form from Punta Arenas, that was referred by Doflein and Balss to *Pas. acutifrons* Bate, but that perhaps will prove to belong to *Pas. Faxoni* Rathb. *Pas. americana* Faxon and *Pas. magna* Faxon occur in the Gulf of Panama, the former and *Pas. Faxoni* Rathb. also near the Galapagos Islands. The sea near Cortez Bank, California, is the habitat of *Pas. affinis* Rathb., *Pas. Corteziana* Rathb. and *Pas. emarginata* Rathb.; the last, however, has also been taken in the Gulf of California, off Concepcion Bay; a fourth species on the coast of California is that which was referred by Miss Rathbun in 1904 to *Pas. magna* Faxon, but which is perhaps different, a fifth, finally, is *Pas. pacifica* Rathb., which occurs sparingly from Unalaska and the Gulf of Alaska southward to the Gulf of California, but which is also known from Cape Natal, South-Africa. The sea around the Hawaiian Islands is inhabited by *Pas. kaiwiensis* Rathb., *Pas. truncata* Rathb. and *Pas. flagellata* Rathb., the first was taken by the "Siboga" in the Bali Sea and between Batjan and the Obi Islands. *Pas. cristata* Bate is only known from off Matuku, Fiji Islands and *Pas. amplidens* Bate is the second species recorded from Japan. Besides *Pas. kaiwiensis* Rathb. still another species of this genus occurs in the Indian Archipelago, namely *Pas. propinqua,* a new form, closely related to *Pas. Sivado* (Risso), but apparently different and which was obtained by the "Siboga" near the Sulu Islands; perhaps even three other species will prove to occur in these seas. The most southern parts of the Indian Ocean near Kaiser Wilhelm II Land and of the Pacific near the Ross Sea are inhabited by *Pas. longispina* Lenz; the only specimen of the former locality was found in the intestines of a pinguin, named *Aptenodytes Forsteri.* Besides *Pas. Sivado* (Risso) still two other species are known from the Indian Ocean, north of the Equator, viz. *Pas. unispinosa* W.-Mas. and *Pas. Alcocki* W.-Mas., which are found in the Bay of Bengal and the Arabian Sea.

As regards the depths at which the species of this genus occur, it may be allowed to refer to the List of the species. The greatest depth recorded is 1410 fathoms, at which *Pas. Scotiae* Stebb. was obtained by the Scottish National Antarctic Expedition, but this species has also been captured by the vertical net from the surface to 600 fathoms. Two other forms, *Pas. Rathbunae* Stebb. and *Pas. princeps* S. I. Smith, were likewise taken at considerable depths, the former at 1332, the other at 1342 fathoms, but *Pas. princeps* occurs also at 349 fathoms. The other species have been found in less deep water, as is shown by the List; the depths vary rather much, not only in different species, but even in the same; the records are, however, generally too few in number to form any definite opinion on the vertical distribution. Some

seem to live normally on or very near the bottom as e. g. *Pas. Sivado* (Risso), though not only post-larval, but even adult specimens of this form are occasionally found in midwater or even at the surface. According to Stanley Kemp *Pas. principalis* should also be confined to the bottom, but Oscar Sund (1912) remarks that this is not always the case, this species having been captured also in midwater. A young specimen of this genus was taken by the "Siboga" in Plankton of the Halmaheira Sea.

1. *Pasiphæa propinqua* de Man. Pl. I, Fig. 1—1 *j*.

Pasiphæa propinqua J. G. de Man, in: Zoologische Mededeelingen, uitgegeven vanwege 's Rijks Museum van Natuurlijke Historie te Leiden. Deel II, 1916, p. 147.

Stat. 100. June 29. 6° 11′ N., 120° 37′.5 E. Near the Sulu Islands. 450 m. Bottom coral. 1 male.

Unfortunately this specimen is rather badly mutilated, the 3rd and the 4th segments of the abdomen are torn from one another and also the 1st and the 2nd, while the antennular and antennal flagella are incomplete. *Pasiphæa propinqua* belongs to the typical species of this genus, to those in which the extremity of the telson is not forked or emarginate; it differs from all known species by that extremity being not truncate or slightly convex, but rather much prominent. This specimen is about 72 mm. long, measured in the middle line, the length (17 mm.) of the carapace is nearly one-third the length (55 mm.) of the abdomen; the carapace, 7,5 mm. high at the level of the branchial regions, is about twice as long as high and in a lateral view it narrows rather much anteriorly as usual; like in the other species the posterior margin is emarginate in the middle. The carapace is rounded dorsally, not carinate. On each side of the middle line the rounded dorsum seems, however, to be slightly pinched in; gradually narrowing anteriorly, it ends in a very small tooth, that has the appearance of being mutilated and incomplete; this tooth is slightly compressed and placed a little behind the front. Front triangular, prominent, subacute, rather narrow, separated by a semicircular curve from the rounded, outer orbital angles that reach as far forward as the front. Antennular angle also obtuse, separated by a shallow sinus from the outer orbital angle and by a deeper, though shorter sinus from the small branchiostegal spine. Anterolateral angle of carapace broadly rounded, branchiostegal sinus shallow. Sides of carapace smooth, with no ridges.

First abdominal tergum rounded, the 2nd shows a trace of an obtuse, indistinct carina posteriorly, the 3rd and the 4th are more distinctly carinate, though the carina is only subacute and does not extend to the posterior margin of the 4th segment; the 5th segment, though much compressed, is again rounded dorsally. The 6th segment, which is 10,5 mm. long and 6,3 mm. broad or high, is one and a half as long as the 5th (6,6 mm.) and also about one and a half as long as broad; it is sharply carinate dorsally, the carina terminates posteriorly in a small acute tooth which is directed downward and one observes, on the anterior half of this segment, a shallow, longitudinal, oval impression, situated twice as far from the lower as from the upper margin and defined above by a curved ridge. The telson (Fig. 1 *f*), which is 8 mm. long, one-fifth shorter than the 6th segment, is deeply grooved dorsally, much compressed and

rather narrow, the width at base being scarcely one-fourth of the length; the posterior extremity is 0,76 mm. broad, $^1/_{10}$—$^1/_{11}$ the length of the telson and $^2/_3$ the width at base. The posterior extremity (Fig. 1 *g*) is triangular, half as high as broad and probably armed on either side with 4 spinules. A much smaller spinule is moreover implanted, on the dorsal surface, just before the external spinule, like in *Pas. Sivado* (Risso) (vide: J. Thiele, in: Zoolog. Jahrb. Suppl. VIII, 1905, p. 467, Pl. 16, fig. 50).

Eyepeduncles reaching hardly beyond the middle of basal antennular article, with a rather large, obtuse tubercle at the base of the inner side; corneae blackish or slate-coloured, little enlarged, situated obliquely on the distal half of the peduncle.

Antennular peduncle reaching a little beyond the middle of the distance between the orbital margin of the carapace and the tip of the antennal scales, 3rd article a little longer than 2nd; stylocerite almost reaching to the distal end of basal article, the outer margin convex, the distal half sharply pointed and, like in the other species, twisted to a right angle with the basal portion.

Inferior spine of basal antennal article well developed, antennal peduncle a little longer than basal antennular article. Scaphocerite 9,1 mm. long, 2,3 mm. broad, a little more than half as long as the carapace and 4-times as long as broad; it narrows rather much anteriorly and the terminal spine is well developed, 0,4 mm. long.

External maxillipeds reaching almost to the distal end of the antennal scales. The legs of the 1st pair (Fig. 1 *h*) reach by two-thirds, those of the 2nd by three-fourths of the fingers beyond the antennal scales. Like in *Pas. Sivado* (Risso) in the two first pairs of legs a spine occurs at the far end of the posterior border of the basipodite, while there is a series of spines along the same border of the meri and a well developed spine at the distal end of the lower border of the carpus. Fingers of 1st pair two-thirds or three-fourths the length of the palm, those of 2nd pair a little, viz. one-sixth, longer than the palm; like in *Pas. Sivado* the chela of 1st pair carries a small spinule on the middle and another of the same size at the distal end of the palm. The following legs apparently also resemble those of *Pas. Sivado*, so e. g. the propodus of the 5th pair (Fig. 1 *i*) is 4,8 mm. long, about 20-times as long as wide; the dactylus (Fig. 1 *j*) measures one-fourth of the propodus, is nearly 4-times as long as wide distally and is, like in the other species, provided at the rounded extremity and on the lower border with long setae, that, like in *Pas. Sivado* (vide J. Thiele, l. c. p. 467, Pl. 16, fig. 51), are armed at one side of their distal half with triangular teeth and at the extremity with 5 or 6 barbed hooks.

According to Alcock (Descript. Catal. Indian Deep-Sea Crustacea, Calcutta 1901, p. 59), *Pas. Sivado* (Risso) should occur in the Bay of Bengal and the Andaman Sea, but unfortunately he does not say in his description whether the abdominal segments are carinate or not, he does not describe the shape of the front and concerning the extremity of the telson he only remarks that it is not forked. It appears therefore doubtful whether his specimens really belonged to *Pas. Sivado*, but probably it has been the case, because the carapace is described as being about half the length of the abdomen without the telson, a proportion which is observed in Risso's species, but not in *Pas. propinqua*. I therefore applied to Prof. Döderlein of Strassburg, who kindly sent me 3 of the 18 specimens of *Pas. Sivado* from Nizza, mentioned

by Dr. ORTMANN in his work on the Decapod Crustacea of the Strassburg Museum, p. 463. The examination of these specimens proved indeed that *Pas. Sivado* is different from *Pas. propinqua.*

The chief differences are presented by the abdomen. In *Pas. Sivado* the carapace measures about half the length of the abdomen without the telson, while in *Pas. propinqua* the abdomen without the telson is almost 3-times as long as the carapace. In one of the 3 specimens the carapace is $17^3/_4$ mm. long, the abdomen 45 mm. and 38 mm. without the telson, in another specimen the carapace is $17^1/_4$ mm. long, the abdomen without the telson which is broken, 39 mm., and in the third these numbers are $16^3/_4$ mm., 44 mm. and 38 mm. In *Pas. Sivado* the abdominal segments are not carinate, even the upper border of the 6th segment, though much compressed, is blunt, not carinate, and the terminal spine runs horizontally backward, whereas in *Pas. propinqua* this segment is sharply carinate and the terminal spine regularly curved downward. The posterior margin of the telson (Pl. I, Fig. 2*a*) is slightly convex, regularly rounded, presenting another form than in *Pas. propinqua* and the telson is less deeply grooved. The front (Pl. I, Fig. 2) is in *Pas. Sivado* also triangular, but comparatively broader, less prominent and projects distinctly less forward than the outer orbital angles, that are angular though obtuse, while in *Pas. propinqua* they are rounded and project nearly as far forward as the front.

In his valuable work on "The Decapoda Natantia of the Coasts of Ireland, Dublin 1910", STANLEY KEMP, however, has pointed out, p. 37, that the abdominal somites of *Pas. Sivado* are not dorsally carinate and that the telson is truncate at apex. A detailed, exhaustive description of *Pas. Sivado* (Risso) does, however, as far as I know, not yet exist.

2. *Pasiphæa* sp. *a*. Pl. I, Fig. 3—3*o*.

Stat. 148. August 10. 0° 17'.6 S., 129° 14'.5 E. Halmaheira Sea. Plankton. 1 young specimen.

I do not succeed in determining with certainty this specimen, but nevertheless wish to describe it. The carapace, measured in the middle line, is 4,6 mm. long, the abdomen 9,7 mm., the entire length 14,3 mm.: the carapace is thus half as long as the abdomen. Front (Fig. 3) broadly rounded, little prominent, projecting much less forward than the rounded, orbital angles; no antennular prominence, antero-lateral sinuses wanting or hardly indicated, branchiostegal spine small. Carapace compressed, though not carinate dorsally. Postfrontal spine slender, obliquely-ascendant, procurved, acuminate.

Abdomen not carinate, the terga of the 1st—5th somite rounded; the 6th somite, which is twice as long as the 5th and twice as long as wide, is very much compressed, but the upper border is blunt, not carinate, and ends in a small acute tooth. Telson (Fig. 3*c*) measuring two-thirds the length of the 6th somite, deeply furrowed along its whole length to near the base; posterior margin truncate, very slightly convex, like in *Pas. Sivado* (Risso), and armed with 4 spinules at either side of the middle line. Endopodite of caudal swimmeret projecting beyond the telson by about one-fifth of its length, exopodite by two fifths.

The antennular peduncle reaches six-sevenths of the way along the distance between the orbital margin and the extremity of the antennal scale; basal article one-third longer than the

two following taken together, 3rd article one-third longer than 2nd, 2nd one-third longer than thick. Stylocerite acuminate, a little shorter than the eyestalks. The eyepeduncles reach to the distal sixth of basal article, their proximal half appears a little wider than the distal half and the distance between the orbital margin and their distal extremity is almost 3-times as long as their greatest width; only a small spot of blackish pigment is visible on the outer side of the cornea. The scaphocerite (Fig. 3*e*) is 1,62 mm. long, about one-third of the length of the carapace, it is nearly 3-times as long as wide and narrows rather little distally; the outer margin is straight and the terminal spine, that projects beyond the rounded extremity of the blade, is 0,106 mm. long.

The external maxillipeds reach almost to the distal end of the scaphocerite, the length of the terminal joint is in proportion to that of the penultimate as 5 : 3.

The peraeopods of the two first pairs extend by somewhat more than the fingers beyond the antennal scales. Merus of 1st pair, like the preceding joints, unarmed, carpus short, about one and a half as long as thick, with a small obtuse tooth at the far end of the lower margin. Chela 2,34 mm. long, fingers shorter than palm, proportion like 5 : 8; width of palm about one-third its length. The 2nd legs (Fig. 3*g—i*) are armed with a spine at the far end of the basipodite, with a spine near the distal third of the merus and with another at the far end of the lower margin of the carpus, the latter twice as long as wide distally. Chela 2,6 mm. long, fingers also shorter than palm, but the proportion is like 6 : 8; palm $4^1/_2$-times as long as wide, its greatest width at the proximal third.

The measurements of the legs of the 3rd pair (Fig. 3*j*, 3*k*) are: ischium long 0,64 mm., merus 1,62 mm., carpus 0,2 mm., propodus 0,78 mm., dactylus 0,38 mm. The exopodite extends to the 2nd third or fourth of the merus. The measurements of the 4th pair (Fig. 3*l*, 3*m*) are: ischium 0,22 mm., merus 0,22 mm., carpus 0,1 mm., propodus 0,23 mm.; there is a seta long 0,14 mm. at the distal end of the propodus and another, 0,06 mm. long, a little behind it. The exopodite projects still a little beyond the terminal joint of the endopodite.

The 5th pair (Fig. 3*n*, 3*o*), finally, presents the following measurements: ischium 0,38 mm., merus 0,9 mm., carpus 0,22 mm., propodus 0,7 mm., dactylus 0,2 mm. long. The dactylus is 3-times as long as broad and bears 6 or 7 setae at the distal end and along the distal half of the lower margin; these setae are, like in *Pas. Sivado* and *Pas. propinqua*, armed along their distal half with triangular teeth and near the extremity with barbed hooks. The exopodite reaches but a short way beyond the ischium.

This species appears closely allied to that from Stat. 141, for which, when indeed new, the name of *hilarula* is proposed (p. 14), but is nevertheless no doubt different. In the species from Stat. 148 the post-frontal tooth has a different form, the upper margin of the 6th abdominal somite ends in a small acute tooth, while the posterior extremity of the telson is very slightly convex. Merus and carpus of the 1st pair of legs have a stouter shape, the merus is quite unarmed, while the merus of the 2nd pair is only armed with one spine. The species from Stat. 148 is also related to *Pas. Sivado* (Risso), but I do not believe that it may be regarded as a young of it.

3. *Pasiphæa* sp. β. Pl. I and II, Fig. 4—4*b*.

Stat. 105. July 4. 6° 8′ N., 121° 19′ E. Off Sulu-island. 275 m. Coralbottom. 1 specimen.

Though this specimen, like that from Stat. 141, seems to belong also to a new species, I likewise hesitate to describe it as such, because it is still young, not yet adult, as supposed. This specimen, indeed, is only 20 mm. long from the anterior margin of the rostrum to tip of telson. In its outer appearance and in several characters it much resembles *Pas. Sivado* (Risso). The carapace, measured in the middle line, proved to be 5,45 mm. long, little more than one-fourth of the whole length, while the length of the carapace is contained two and two-thirds times in the length of the abdomen. Rostrum (Fig. 4*a*) rounded, little prominent and much broader at base than long; outer orbital angles obtuse, projecting far beyond the rostrum. Antennular prominence also rounded, hardly separated from the outer orbital angle by a short and very shallow sinus, but by a broader and deeper sinus from the rounded antero-inferior angle of the carapace. Branchiostegal spine small, behind which the branchiostegal sinus appears very broad though shallow. The carapace which is 3-times as long as high at the level of the branchial regions, narrows rather much anteriorly like in *Pas. Sivado* and the linear distance, 1,2 mm., between the two branchiostegal spines, is a little shorter than the height, 1,68 mm., of the carapace at the level of the branchial regions. The upper border of the carapace is obtuse, rounded, not carinate; a little behind the rostrum it descends obliquely to the level of the front and while the carapace is here, at the anterior fourth or fifth, distinctly pinched in on each side of the middle line, the anterior extremity of the upper border looks like a tuberculiform post-frontal tooth. A short obtuse crest unites this post-frontal tooth with the anterior margin of the rostrum. Lateral sides of carapace smooth, without ridges or grooves.

The first five abdominal somites are rounded dorsally. The 5th somite which is 1,6 mm. long, measured along the upper border, appears half as long as the 6th, that measures 3,5 mm.; the 6th somite, twice as long as high, is strongly compressed, as usual in this genus, its upper border, however, is blunt and terminates posteriorly in a small sharp tooth, that is directed horizontally backward. The telson is 2,45 mm. long, about two-thirds the length of 6th somite, 0,6 mm. wide at base, while the posterior extremity (Fig. 4*c*) is 0,25 mm. broad; the posterior extremity appears slightly convex like in *Pas. Sivado*, the spinules are lost except those at the outer angles, that are 0,27 mm. long. The telson is deeply and widely grooved dorsally to near the base, it reaches a little beyond the middle of the outer plate of the tailfan and to the posterior fourth or fifth of the inner.

Eyestalks cylindrical, not dilated distally, reaching nearly to the distal extremity of basal antennular article, cornea small, blackish, situated on the outer side and measuring one-fifth the length of the stalks.

Antennular peduncle 2 mm. long, one-tenth the length of the body and reaching four-fifths of the way along the antennal scale; basal article little, only one-fifth, longer than the 2nd and 3rd taken together, 2nd measuring about one-third of basal article and one-third longer than thick, 3rd one-fourth longer than 2nd. Antennular scale as long as the eyestalks.

Scaphocerite (Fig. 4*d*) 2,2 mm. long, two-fifths the length of the carapace, three and two-thirds times as long as wide and showing the greatest width a little behind the middle; it narrows rather little distally, the outer margin is straight and the terminal spine extends by half its length beyond the rounded tip of the blade.

External maxillipeds reaching almost to the distal extremity of the scaphocerite, very slender, the length of the terminal joint is in proportion to that of the penultimate as 5 : 3, these joints being respectively 1,34 mm. and 0,84 mm. long; the terminal joint is 13-times, the penultimate 8-times as long as wide. The exopodite extends almost to the distal extremity of the antepenultimate joint.

Basipodite of the peraeopods of the 1st pair (Fig. 4*f*) with a short spine at the far end of the posterior border. Merus with 4 spines on the posterior border, the 1st at the proximal sixth, the 2nd just behind the middle, the 3rd at the distal fifth and the 4th twice as far from the 3rd as from the distal extremity of the merus; the 2nd and the 3rd spine are a little larger than the two others. Carpus (Fig. 4*g*) about one-fourth of the merus, slightly more than twice as long (0,56 mm.) than thick distally (0,26 mm.), with a short subacute tooth at the far end of the posterior border. Chela a trifle longer than the merus and 4-times as long as the carpus, fingers shorter than palm, proportion like 3 : 5; palm about 4-times as long as wide. Exopodite reaching to 2nd third of merus.

Basipodite of the peraeopods of the 2nd pair (Fig. 4*h*) with a spine at the far end of the posterior border. Posterior border of merus armed with 10 spines of somewhat unequal length, merus one-third longer than that of the 1st pair. Carpus (Fig. 4*i*) one-fifth of the merus, twice as long as thick, with a sharp spine at the far end of the posterior border, which spine is more developed than that with which the carpus of 1st pair is armed. Chela as long as the merus, almost 5-times as long as the carpus, fingers shorter than palm, proportion like 2 : 3; palm almost 6-times as long as wide. Exopodite reaching to 2nd fifth of merus.

The measurements of the legs of the 3rd pair (Fig. 4*j*) are: Ischium long 0,7 mm., merus 1,7 mm., carpus 0,23 mm., propodus 0,94 mm., terminal joint 0,39 mm. Exopodite extending almost to 2nd fourth of merus. Ischium of 4th pair (Fig. 4*l*—*n*) 0,4 mm. long, merus 0,26 mm., carpus 0,15 mm., propodus 0,25 mm., the very short conical dactylus 0,07 mm.; a short seta at the far end of the posterior border of the carpus, posterior border of propodus with 6 setiferous setae, a seta long 0,16 mm. at the distal end of the dactylus with a finer and shorter one just near it. Exopodite just exceeding the merus.

Ischium of 5th pair (Fig. 4*o*) 0,66 mm. long, merus 1,4 mm., carpus 0,46 mm., propodus 1,16 mm., dactylus 0,34 mm.; dactylus (Fig. 4*p*) spatuliform, 0,12 mm. wide, almost 3-times as long as wide and furnished with 10 setae, of which the longest at the tip is distinctly longer than the dactylus, while the rest gradually decrease in length.

This form appears most closely related to the specimen from Stat. 148. Carapace and abdomen, indeed, closely agree, excepting the proportion between length of carapace and abdomen. The antennular peduncle reaches farther forward and the basal article is distinctly longer in proportion to the two following than in the specimen from Stat. 105. The thoracic legs show also different characters. In the 1st pair the carpus has a much stouter shape

than in the specimen from Stat. 105, the merus is quite unarmed and the chela more swollen, of the 2nd pair the merus bears but one single spinule on its posterior border.

4. *Pasiphæa* n. sp.? Pl. II, Fig. 5—5*f*.

Stat. 141. August 5. 1°0′.4 S., 127°25′.3 E. Between Batjan and the Obi Islands. From 1500 m. to surface.

I do not prosper in determining with certainty this specimen, which probably belongs to a new species; on account of its small size it seems to be young. The proportion between the length of carapace and abdomen is the same as in *Pas. kaiwiensis* Rathb., the former being $8^1/_4$ mm. long, measured in the middle line, the latter $23^1/_4$ mm., the entire length being 31 or 32 mm. Front broadly triangular, obtuse, resembling that of *Pas. kaiwiensis* (Fig. 6) and as little prominent. There is no sinus between the rounded outer orbital angle and the likewise rounded antennular prominence, while the two following sinuses are more shallow than in *Pas. kaiwiensis*, so that the antero-lateral margin of the carapace shows a different appearance from that species. The dorsal tooth is rather small, triangular, acute, though not spiniform as in *Pas. kaiwiensis*, its upper margin is nearly straight and it does not reach to the level of the frontal prominence. For the rest the carapace resembles that of *Pas. kaiwiensis*, being $3^3/_4$ mm. high at the level of the branchial regions.

The abdomen (Fig. 5*a*) also agrees with that of *Pas. kaiwiensis*, except in the following. The 6th segment, 5,5 mm. long and 2,5 mm. broad, is almost twice as long as the 5th (2,9 mm.) and a little more than twice as long as broad, while in *Pas. kaiwiensis* the proportion is like 5 : 3: the 6th segment appears therefore narrower and the lower margin ends posteriorly in a small spine. The telson is 3,8 mm. long, nearly two-thirds the length of the 6th segment; the tip, 0,4 mm. broad, is hardly emarginate, still less than that of *Pas. kaiwiensis*, and it is half as broad as the base of the telson, the upper surface of which resembles that of *Pas. kaiwiensis*. Eyestalks like in this species, but the corneae pale brown.

The antennular peduncle reaches three-fourths of the way along the antennal scale, 3rd joint one and a half as long as 2nd; stylocerite as in *Pas. kaiwiensis*. Antennal peduncle reaching almost to the distal end of 2nd antennular article, spine on basal joint like in *Pas. kaiwiensis*. Scaphocerite (Fig. 5*b*) 3,6 mm. long, not yet half as long as the carapace, comparatively wider than that of *Pas. kaiwiensis*, being 1,1 mm. broad, about 3-times as long as wide; the scaphocerite is also less narrowed distally than in *Pas. kaiwiensis* and the terminal spine is shorter, reaching hardly beyond the blade.

The external maxillipeds extend to the distal extremity of the scaphocerite. The peraeopods of the 1st pair (Fig. 5*c*, 5*d*) reach by the fingers and one-third of the palm, those of the 2nd by the fingers and almost half the palm beyond the antennal scale. Merus of the 1st pair 3,45 mm. long, 11-times as long as wide in the middle, where a small spinule is implanted; merus hardly thickened at the distal end. Carpus one-fourth of the merus, twice as long as thick distally. Chela 4,26 mm. long, nearly one-fourth longer than the merus, palm comparatively longer than in *Pas. kaiwiensis*, one and a half as long as the fingers and 4-times as long as

wide in the middle. Exopodite reaching to the middle of the merus. Basis and ischium of 2nd legs (Fig. 5*e*) like in *Pas. kaiwiensis*, merus 4,5 mm. long, one-third longer than that of 1st pair, 11-times as long as broad in the middle, not thickened at distal extremity and armed with 3 well-developed spines, long 0,23 mm., along the distal half and with 5 or 6 rudimentary spinules along the proximal half. Carpus 0,8 mm. long, about one-sixth the length of the merus, and one and a half as long as thick distally; lower margin with acute spine at the extremity. Chela 5,7 mm. long, one-fourth longer than the merus, fingers (2,7 mm.) one-tenth shorter than the palm (3 mm.), which is nearly 5-times as long as wide.

Merus of 3rd legs (Fig. 5*f*) 3,7 mm. long, 37-times as long as wide in the middle, somewhat thickened at the proximal extremity, a little less at the distal one. Carpus 0,36 mm. long, one-tenth of the merus and nearly 3-times as long as thick in the middle. Terminal joint tapering, 2,25 mm. long, about two-thirds of the merus, with a few marginal setae.

Ischium of 4th legs (Fig. 5*g*) 0,6 mm. long, merus 1,2 mm., twice as long as the ischium and 8-times as long as wide; following joints lost.

Merus of 5th pair (Fig. 5*h*) 2,12 mm. long, 12-times as long as wide; carpus 0,8 mm. long, 0,19 mm. thick distally; propodus 1,88 mm. long, dactylus (Fig. 5*i*) long 0,48 mm., broad 0,21 mm., little more than twice as long as wide, for the rest like in *Pas. kaiwiensis*. The carpus appears therefore a little less than half as long as the merus and the propodus, the latter a little shorter than the merus, while the dactylus measures one-fourth of the propodus.

The species with which this specimen presents some affinities, are *Pas. cristata* Bate, *Pas. americana* Faxon and *Pas. flagellata* Rathb. *Pas. cristata* Bate from the Fiji Islands resembles the specimen from Stat. 141 as regards the abdomen, the carapace and the two pairs of antennae, but the post-frontal tooth has a different shape, like also the anterolateral margin of the carapace, while the legs show different measurements. The carpus of the two first pairs appears in the specimen from Stat. 141 shorter in proportion to the length of the palm and the merus of the 2nd pair is armed with several spinules, in *Pas. cristata* only with one. In the legs of the 3rd pair the carpus appears also shorter in proportion to the terminal joint than in *Pas. cristata*. Unfortunately the extremity of the telson was not described by Spence Bate.

Pas. americana Faxon differs by the carapace being longer in proportion to the length of the abdomen, by the telson being more deeply notched, by the narrower scaphocerite, which is 4-times as long and wide and by the meri of the legs of the 1st and 2nd pair being only furnished with a single spine near the middle of its inferior margin.

Pas. flagellata Rathb. from the Hawaiian Islands differs by the length of the carapace being contained little more than twice in the length of the abdomen, by the 6th segment of the abdomen being bluntly carinate, slightly exceeding the telson, and being wider in proportion to its length.

When this species should indeed once prove to be new to science, the name of *Pas. hilarula* is proposed for it.

5. *Pasiphœa kaiwiensis* Rathb. Pl. II, Fig. 6—6*l*.

Pasiphœa kaiwiensis M. J. Rathbun, in: U. S. Fish Commission Bulletin for 1903, Part III, Wash. 1906, p. 927, Pl. XXIII, fig. 4.

Stat. 316. Febr. 19, 1900. 7° 19'.4 S., 116° 49'.5 E. Bali Sea. 538 m. Bottom fine, dark brown sandy mud. 1 female without eggs.

This female is not yet full-grown, it measures 73 mm. from the frontal margin of the carapace to tip of telson, while the type specimen from the Hawaiian Islands, an ovigerous female, was 99,7 mm. long. Of the specimen from the Bali Sea the carapace, measured in the middle line, is 18 mm. long, the abdomen 55 mm., so that the latter is 3-times as long as the carapace. The greatest height of the carapace, at the level of the branchial regions, is $7^1/_2$ mm., so that the carapace appears a little more than twice as long as high; in a side view it narrows rather much anteriorly, so that at the posterior end of the branchiostegal sinus the carapace appears only half as high as at the level of the branchial regions. The frontal margin, above the base of the eye-peduncles, appears broadly rounded when looked at from above, but is little prominent. The carapace, the posterior margin of which is emarginate, is rounded dorsally and armed anteriorly, just behind the front, with a compressed, obliquely-ascendant tooth, of which the acute spiniform apex reaches almost to the level of the front and the sharply carinate, upper edge of this tooth is slightly concave; the tooth is one millimeter high. Outer orbital angle obtuse, projecting a little more forward than the front, post-antennular angle defined, blunt and separated both from the outer orbital angle and from the rounded anterolateral angle of the carapace by a shallow sinus. Branchiostegal spine well developed, the linear distance between their apices being 5 mm. long. The anterolateral angle of the carapace is followed by the branchiostegal sinus, which is somewhat longer than the two sinuses situated before it. The sides of the carapace are apparently smooth, without ridges.

Unfortunately on the photograph of the type the frontal tooth is quite invisible.

Abdomen (Fig. 6*c*) not carinate. While the 1st, 3rd and 4th terga are rounded, the 2nd and the 5th are even slightly flattened dorsally. The 6th segment which is 10 mm. long, measured dorsally, and 6 mm. broad, is half as long again as the 5th ($6^2/_3$ mm.); it is much compressed, but the slightly convex upper margin is blunt, smooth, and posteriorly truncate. The telson, 8 mm. long, is four-fifths as long as the 6th segment; the tip (Fig. 6*d*) shows a shallow emargination in the middle, unfortunately the spinules at the tip are mostly lost, but 4 or 5 pairs occur no doubt in this species. The tip is 0,8 mm. broad and the telson is about twice as broad, viz. 1,7 mm., at the base; the spinules at the outer angles of the tip are probably 0,5 mm. long, the other spinules are a little shorter. The upper surface of the telson is flattened, but the posterior third is grooved, the groove passing gradually into the flattened surface. The endopodite of the caudal swimmeret projects about by one-third, the exopodite almost by half its length beyond the tip of the telson.

According to the original description, the eyes should be considerably enlarged distally. In the female from Stat. 316, however, this is not the case. The eye-peduncles, indeed, that reach about to the distal third of 1st antennular article, are only twice as long as broad at the base of the corneae, where they are a little enlarged; the corneae are half as long as the eyestalks and of a grayish colour, their posterior margin is blackish and there is a blackish spot on the outer side.

The antennular peduncle reaches a little beyond the middle of the scaphocerite, basal

joint as long as the 2nd and 3rd taken together, 3rd joint twice as long as 2nd; flagella not complete. Antennular scale acute, its distal half twisted, like in other species, to a right angle with the basal portion and sharply carinate above; the scale reaches almost to the end of basal article. There is a small spine, directed inward, on the anterior margin of the lower surface of basal antennal article and the peduncle hardly projects beyond the 1st article of the inner antennae. Scaphocerite (Fig. 6*e*) $9^1/_2$ mm. long, half as long as the carapace and about 4-times as long as wide, presenting its greatest width at the posterior fourth and narrowing from here much more distallythan proximally; outer margin slightly convex, terminal spine well developed, 0,6 mm. long, $^1/_{16}$ the entire length of the scale.

External maxillipedes reaching almost to the apex of the antennal scales, the terminal joint, like in *Pas. cristata*, somewhat spatuliform and widened distally, about one and a half as long as the preceding joint. The peraeopods of the 1st pair (Fig. 6*f*) extend by a little more than half the length of the fingers beyond the antennal scale, those of the 2nd by two-thirds that length. Ischium of 1st legs unarmed, but with some short setae on the lower margin. Merus 7,7 mm. long, 12-times as long as wide in the middle and somewhat thickened at the distal end, being here one-third thicker than in the middle; lower margin with 2 small spinules in the middle, of which the posterior larger one is 0,3 mm. long. Carpus one-fourth of the merus and half as thick distally as it is long. Chela a trifle, viz. $^1/_{15}$, longer than the merus, palm one-fourth longer than the fingers and nearly 4-times as long as wide in the middle, narrowing somewhat towards the carpal articulation and towards that of the fingers; fingers tapering, crossing one-another and acuminate. Exopodite reaching to the middle of the merus.

Lower margin of base of 2nd legs (Fig. 6*g*) terminating in a small spine, for the rest unarmed like the ischium. Merus 9,6 mm. long, one-fourth longer than that of 1st legs, its form is the same, but it is not thickened at the distal extremity and it is armed, along the lower margin, with 14 spinules of somewhat unequal length, though usually 0,32—0,35 mm. long. Carpus about one-sixth the length of the merus, one and a half as long as thick distally, the lower margin terminating in an acute spine. Chela 10,4 mm. long, nearly as long as the merus, fingers (6,1 mm.) about one and a half as long as the palm (4,3 mm.), that is 4-times as long as wide; fingers like those of 1st pair. Exopodite reaching to the 2nd third of the merus.

The merus of the slender legs of the 3rd pair (Fig. 6*h*), that extend almost to the distal end of the merus of 2nd pair, is 8,8 mm. long, 55-times as long as wide in the middle and gradually thickens somewhat towards the proximal extremity, a little less towards the distal one. The carpus, 4-times as long as thick in the middle, is short and measures but $^1/_{13}$ the length of the merus. The tapering terminal joint, finally, is 3,8 mm. long, not yet half as long as the merus; it carries a few setae and 3 or 4 at the extremity. The exopodite does not extend to the middle of the merus.

Legs of 4th pair (Fig. 6*i*, 6*j*), half as long as the 3rd, less slender. Ischium 1,2 mm. long, merus 3,15 mm., carpus 0,8 mm., propodus 1,56 mm. and dactylus 0,46 mm.; merus 12-times as long as wide, somewhat setose, carpus one-fourth, propodus half as long as the merus, dactylus about one-third of the propodus, 3-times as long as broad, with some setae along the lower margin, the longest of which, at the distal extremity, is one and a half as long as the joint. Exopodite reaching to the distal end of the carpus.

The legs of the 5th pair (Fig. 6*k*, 6*l*) extend almost to the middle of the merus of the 2nd and are nearly as slender as those of the 4th pair. Merus 4,9 mm. long, carpus 1,8 mm., propodus 3,72 mm., dactylus 1,06 mm. Merus 13-times as long as wide in the middle, almost 3-times as long as the carpus, which is about 6-times as long as thick at the distal end; propodus twice as long as the carpus, dactylus about one-fourth the propodus, nearly 3-times as long as wide, somewhat spatuliform and armed at the rounded distal extremity and along the lower margin with setae; the seta at the distal end of the upper margin is the longest of all, twice as long as the dactylus, while the rest gradually decrease in length. Exopodite short, little longer than ischium.

General distribution: Hawaiian Islands (RATHBUN).

Psathyrocaris W.-Mas.

The genus *Psathyrocaris* W.-Mas., characterized besides by other characters by the extraordinary length of the exopodites of the abdominal appendages, is represented by five species and one variety. *Psath. fragilis* W.-Mas., the first described species, occurs in the Bay of Bengal and the Arabian Sea, probably also in the Indian Archipelago, for a specimen, captured by the "Siboga" off the south coast of Muna Island, must very likely be referred to this species. A variety *atlantica* Caull. occurs in the Gulf of Gascony, the only not indopacific locality from which this genus is known. *Psath. platyophthalmus* Alcock and Anderson is found in the Bay of Bengal and the Arabian Sea, *Psath. plumosa* Alcock and Anderson in the Arabian Sea and *Psath. infirma* W.-Mas. in the Andaman Sea. *Psath. hawaiiensis* Rathb., the 5th and last species, finally, has been taken in the vicinity of Modu Manu, one of the Hawaiian Islands and situated close to the northern tropic.

As regards the vertical range, it must be observed that the specimen of *Psath. fragilis* from off the south coast of Muna Island was captured at the greatest depth, namely of 1030 fathoms, but this species has also been taken at 172 and at 609—620 fathoms in the Arabian Sea, in the Bay of Bengal at 240 and at 609 fathoms. The three other species that occur in the Indian Ocean north of the Equator, have been found at depths varying between 405 and 902 fathoms, *Psath. hawaiiensis* at 876 fathoms, while the variety *atlantica* was taken by the "Caudan" at 437 fathoms. *Psathyrocaris* W.-Mas. proves thus to be a truly deep-sea genus.

1. *Psathyrocaris fragilis* W.-Mas.

Psathyrocaris fragilis J. Wood-Mason, Ann. Mag. Nat. Hist. Ser. 6, Vol. XI, Febr. 1893, p. 171, Pl. X, XI.
Psathyrocaris fragilis A. Alcock, A descr. Catal. Indian Deep-Sea Crust., Calcutta 1901, p. 69. Illustrations of the Zoology of the Investigator, Crustacea, Pl. LII, fig. 5.

Stat. 208. Sept. 22. 5° 39′ S., 122° 12′ E. Off the south-coast of Muna Island. 1886 m. Bottom solid green mud. 1 specimen.

Unfortunately this specimen is much mutilated, the carapace partly folded and wrinkled, the antennular and antennal flagella, like the legs, wanting, the eye-peduncles, finally, are

excavated above, having apparently been crushed. It is therefore with some doubt referred to this species.

Integument smooth. The carapace with the rostrum is probably 19 mm. long, the abdomen about 35 mm., so that the latter should be slightly longer with regard to the length of the carapace than in older specimens, because, according to Professor ALCOCK, in an average specimen the median length of the carapace and the rostrum should be 23 mm., of the abdomen 38 mm. The rostrum has the same form and length as in the Figure 5 of the "Illustrations", but the low prominence at the base does not exist, the upper margin being quite straight. The upper margin is armed with 16 minute teeth, the foremost of which is placed near the apex, there is a larger interspace between the 10th and 11th tooth, these two teeth being nearly as far distant from one another as the 1st from the 3rd and the 2nd tooth is one and a half as far distant from the 1st as from the 3rd, while the 3$_{rd}$ to the 8th stand closer together; the 11th tooth is also placed nearer to the 12th than the following.

The 5th abdominal somite, measured along the dorsal border, proves to be 3,5 mm. long, the 6th 9,25 mm., the proportion being the same as in Fig. 5 of the "Illustrations", the 6th somite appears therefore almost 3-times as long as the 5th, not twice as long (ALCOCK, l. c.); it appears also a little less broad (3,5 mm.) in proportion to its length than in the figure of the "Illustrations", owing perhaps to its somewhat younger age. The extremity of the telson is broken off.

Eyes brown, according to ALCOCK they are in this species "nearly black". Joints of the antennular peduncle like in Fig. 5 of the "Illustrations", the 2nd joint being one and a half as long as the 3rd; antennular scale reaching to the end of 2nd joint.

General distribution: Bay of Bengal, 240 and 609 fathoms (ALCOCK); Arabian Sea, off the Malabar coast, 172 fathoms, off the Sind coast, 609—620 fathoms.

Leptochela Stimps.

The genus *Leptochela* Stimps. includes at present 5 or perhaps 7 species, of which 3 or 5 are found in the Indopacific and 2 on the east coast of America. *Lept. gracilis* Stimps. is found in the seas of Japan, but has also been observed off the west coast of Korea. *Lept. robusta* Stimps. occurs near the Loo Choo Islands, in the Chinese Sea and in the Indian Archipelago, where this species was obtained by the "Siboga" at no less than fifteen Stations, while it was already known from Ternate; the distribution of this species seems, however, to be much wider, for it has been recorded as well from the Hawaiian Islands as from the Red Sea. *Lept. pugnax* de Man, a new species of small size, was captured by this expedition off the Kei-islands and in the Bay of Bima. *Lept. aculeocaudata* Paulson is known from the Red Sea and from Djibouti, but is regarded by Dr. BALSS as a synonym of *Lept. robusta* Stimps. A species, finally, described in the Report on the Challenger Macrura under the name of *Lept. robusta* and 16 specimens of which were taken off East Moncoeur Island, Bass Strait, will perhaps once prove to differ from all other species. *Lept. serratorbita* Bate, which by its finely serrated or spinulous orbits differs from all the other species, occurs off the Virgin Islands and Porto Rico, while it is also known from Key West. The other species from the

east coast of America is *Lept. carinata* Ortm., which is distributed from off the mouth of the Tocantins, Brazil, to the Bahamas.

The species of this genus are found in rather shallow water, the greatest depth recorded being 150 fathoms, at which a female with eggs of *Lept. robusta* Stimps. was dredged by the Siboga expedition, the same species was, however, also obtained on the reef and at intermediate depths.

1. *Leptochela robusta* Stimps. Pl. III and IV, Fig. 7—7*x*.

Leptochela robusta W. Stimpson, in: Proc. Acad. Nat. Sciences Philadelphia, 1860, p. 43.
Leptochela robusta J. G. de Man, in: Abhandl. Senckenb. Naturf. Gesells. Bd. XXV, 1902, p. 902.
Leptochela robusta M. J. Rathbun, in: U. S. Fish Commission Bull. for 1903, Part III, Wash. 1906, p. 929.
Leptochela robusta H. Balss, Die Decapoden des Roten Meeres. I. Macruren. Wien 1915, p. 17.
Leptochela robusta J. G. de Man, in: Zoologische Mededeelingen, uitgegeven vanwege 's Rijks Museum van Natuurlijke Historie te Leiden, Dl. II, Afl. 3 en 4, 1916, p. 148.

Stat. 37. March 30/31. Sailus Ketjil, Paternoster-islands. Plankton, surface. 3 very young specimens.
Stat. 41. April 3. 7° 25′ S., 117° 50′.5 E. Plankton, surface to a depth of 10 m. 7 young specimens.
Stat. 47. April 8/12. Bay of Bima, near south fort. 55 m. Bottom mud with patches of fine coral sand. 1 young male.
Stat. 105. July 4. 6° 8′ N., 121° 19′ E. 275 m. Coralbottom. 1 female with eggs.
Stat. 109. July 5/6. Anchorage off Pulu Tongkil, Sulu-archipelago. 13 m. Lithothamnion-bottom. 1 young specimen.
Stat. 114. July 8. 0° 58′.5 N., 122° 55′ E. Kwandang-bay-entrance. 75 m. Bottom hard sand, very fine. 1 young female with eggs.
Stat. 133. July 25/27. Anchorage off Lirung, Salibabu-island. Up to 36 m. Bottom mud and hard sand. 1 young male.
Stat. 141. August 5. 1° 0′.4 S., 127° 25′.3 E. Bottom very fine, hard sand. 1 male.
Stat. 142. August 5/7. Anchorage off Laiwui, coast of Obi major. Plankton. At night. 1 very young specimen.
Stat. 153. August 14. 0° 3′.8 N., 130° 24′.3 E. North of Waigeu-island. 141 m. Bottom fine and coarse sand with dead shells. 61 specimens, 22 males and 39 females, that are all ova-bearing.
Stat. 166. August 22. 2° 28′.5 S., 131° 3′.3 E. 118 m. Bottom hard, coarse sand. 1 young male.
Stat. 181. Sept. 5/11. Ambon. 54 m. Bottom mud, sand and coral. 1 young male.
Stat. 204. Sept. 20. 4° 20′ S., 122° 58′ E. Between islands of Wowoni and Buton, northern entrance of Buton-strait. From 75—94 m. Bottom sand with dead shells. 1 young specimen.
Stat. 285. January 18, 1900. 8° 39′.1 S., 127° 4′.4 E. Anchorage south coast of Timor. 34 m. Bottom on the limit between mud and coral. Lithothamnion. 1 young male.
Stat. 296. January 24/26, 1900. 10° 14′ S., 124° 5′.5 E. Anchorage off Noimini, south coast of Timor. Reef. 1 young male.
Stat. 313. Febr. 14/16, 1900. Anchorage East of Dangar Besar, Saleh Bay. Up to 36 m. Bottom sand, coral and mud. 4 young males.

Like in *Lept. carinata* Ortm. (M. J. Rathbun, U. S. Fish Commission Bulletin for 1900, Vol. 2, Wash. 1901, p. 127), the carapace of the female is tricarinate dorsally, while that of the male is rounded. The ova-bearing females from Stat. 153 are all nearly of the same size,

32 or 33 mm. long from apex of rostrum to tip of telson, the length of the carapace, measured in the middle line, being one-third that of the abdomen; the males are but little, 2 or 3 mm., shorter. The carapace of the male, which, like that of the female, is deeply emarginate posteriorly, appears, when measured in the middorsal line, one and a half as long as high, the carapace presenting its greatest height just in front of the posterior emargination; it is smooth and shining and regularly rounded dorsally. The rounded upper border appears, in a lateral view, usually slightly convex, running obliquely downward to the tip of the rostrum, but sometimes quite straight and in one specimen the gastric region appears, just behind the rostrum, even slightly depressed; the acuminate rostrum that reaches to the middle of the corneae of the eye-peduncles, or almost to the distal end of the latter, is obtusely and indistinctly carinate above and commonly slightly turned downward, while in those specimens, in which the dorsum is straight, it runs horizontally forward. In some individuals the tip of the rostrum is slightly curved upward. From the outer orbital angle which is rounded, the anterior border of the carapace runs slightly forward and downward and passes with a regular curve into the lower border; a little behind that border one observes a fine, short, longitudinal groove, separating the gastric from the hepatic region; the cardiac region which passes into the gastric, is sometimes defined on each side by a fine, longitudinal, shallow groove from the branchial regions, but often this groove is not developed at all. The margin of the posterior emargination is flattened and more or less distinct from the upper surface of the carapace.

In the female (Fig. 7*c*) the median carina appears in the middle of the carapace compressed, though obtuse and low, along a distance of about 1,5 mm.; this narrow compressed part widens at the anterior third of the carapace and tapers then to the extremity of the rostrum and this widened anterior part of the carina is rounded. In the same manner the compressed median part of the carina gradually widens backward to the depressed margin of the posterior emargination and is here also rounded. The lateral carinae arise from the orbital margin just behind the eyestalks, run at first parallel or converge even a little backward nearly to the level of the middle of the compressed part of the median carina, but then slightly diverge backward to near the flattened border of the posterior emargination: in some specimens the lateral carinae are therefore straight, while in other ones they appear slightly concave on their anterior third. The lateral carinae are rather narrow, low, though blunt on their anterior third, but gradually widen backward and are here rounded. The two grooves by which the lateral carinae are separated from the median one, are shallow anteriorly and posteriorly, but somewhat deeper near the middle; the lateral carinae are also bounded on the outer side by a shallow depression to near the posterior margin of the carapace, this depression becomes posteriorly deeper, more defined and triangular.

As already observed by Miss Rathbun, the 5th abdominal somite is almost as a rule bluntly and indistinctly carinate, the posterior extremity, however, is unarmed; it was previously overlooked by Stimpson and by me. The 6th somite, hardly shorter than the 5th, is regularly rounded dorsally and carries at the base a broadly triangular, transverse prominence, which is convex anteriorly and which, in a lateral aspect, looks like a low subacute tubercle. The posterior margin of the dorsal surface presents at either side a small narrow notch and close

to it a small acute spine directed outward; the lower borders of this somite end in an acute tooth and one observes, close to the latter, though already on the lower surface of the somite, a small spine, which is directed backward and placed near the posterior margin (Fig. 7*e*). Concerning the telson (Fig. 7*f* and 7*g*), which in the adult female is 5 mm. long (without the terminal spines), I have remarked in my description of 1902 that the upper surface was armed with three pairs of spines and the tip with four: this was not quite right, for the tip is armed with five pairs. Of the 3 pairs of spines on the upper surface the anterior is situated in the adult female near the base, at about $^1/_{12}$ of the entire length distant from the proximal extremity, the two spines are implanted near the middle line, 0,5 mm. long and 0,36 mm. distant from one another; the 2nd and the 3rd pair are implanted close to the margins of the telson, the 2nd pair situated at the anterior third and 0,44 mm. long, those of the 3rd pair just behind the middle, at $^{29}/_{30}$ of the length from the base, and these spines are 0,42 mm. long. The median spines of the posterior extremity i. e. those of the 1st pair, are 0,54 mm. long, those of the 2nd pair 1,4 mm., the longest of all, those of the 3rd pair 1,16 mm., the spines of the 4th pair, implanted just in front of the 3rd, are 0,55 mm. long, the spines of the 5th pair, finally, are those that were overlooked by me in 1902; they are implanted between the 2nd and the 3rd pair, are slightly bent inward, 0,58 mm. long, reach hardly beyond the truncate extremity of the telson and are armed on both margins with similar small denticles as occur also on the inner margin of the other spines.

The peduncle and the longer (outer) flagellum of the inner antennae measure together, in the adult female, about 21 mm., being about 3-times as long as the carapace, when measured in the dorsal median line ($7^1/_4$ mm.), while the outer flagellum is twice as long as the carapace: according to Stimpson the antennulae should be hardly longer than the latter. The scaphocerite of the adult female is 4 mm. long and $3^1/_2$-times as long as wide, presenting the greatest width at the posterior fourth or fifth; it has an elongate triangular form and, gradually narrowing distally, ends in a sharp spine, that is 0,18 mm. long.

The mandibles are broad, flat, though slightly concave; their margin, which is not deeply cleft like in *Lept. gracilis* Stimps., is armed with 12 or 13 teeth that from before backwards decrease in size; the 5 or 6 anterior teeth are considerably larger than the rest, their form is somewhat variable and sometimes even differs in the two mandibles of the same individual, as in the two of the adult ova-bearing female from Stat. 153, figured Fig. 7*h* and 7*h'*. In the right mandible of this specimen the 2nd tooth is the largest of all and bears a secondary denticle at the base of its posterior margin; the 3rd and the 4th are subequal, smaller than the 2nd, a little larger than the 1st; the 5th and the 6th are also subequal and only half as large as the two preceding, the following small teeth regularly decrease in size. In the left mandible the 2nd tooth is also the largest of all, but bears no secondary tooth; the 1st tooth is but little smaller than the 2nd, the 3rd only half as large as the 1st, the 4th almost of the same size as the 1st, little smaller, the 5th nearly of the same size as the 3rd, while the remaining small teeth regularly diminish in size. In a male specimen from the same Station the 1st tooth bore a small denticle on its outer margin and was of the same size as the 4th; the 2nd was twice as large, the largest of all, the 3rd a little smaller than the 1st, the

5th somewhat smaller than the 3rd, while the 6th and following teeth were much smaller and gradually decreased in size. The single-jointed palp (Fig. 7*i*) appears somewhat shorter with regard to its width than that of *Lept. serratorbita* (C. Spence Bate, Report Challenger Macrura, Pl. CXXXIX, fig. 1*d*), being just one and a half as long as wide; the anterior margin is truncate and tipped with 12 or 13 feathered setae, while 3 are implanted on the middle of the slightly convex outer margin.

The inner branch of the 1st maxilla (Fig. 7*j*) has a conical shape with rounded tip, which is beset with 6 or 7 spiniform setae, while 2 or 3 occur on the margins; its form in *Lept. serratorbita* is somewhat different (Challenger Macrura, Fig. 1*e* of Plate CXXXIX); the middle lobe is armed, on its antero-internal margin, with 7 or 8 spines and a much larger number of setae; the outer branch or palp, finally, has the same form as in *Lept. serratorbita*, but is single-jointed, the "bud-like" terminal joint of Bate being not separated from the rest.

The 2nd maxilla (Fig. 7*k*) much resembles that of *Lept. serratorbita*. Of the 3 inner lobes the anterior is quadrangular, but one-fourth longer than wide, with rounded angles; the middle lobe is not yet half as broad as the anterior, the proportion being as 7 : 3, its outer margin is also rounded or truncate, the posterior lobe, finally, is triangular with acute tip; the outer margin of the 3 lobes is closely fringed with feathered setae and there is a transverse row of 6 setae on the 2nd lobe near the base. Scaphognathite well developed, the anterior lobe wider than the posterior.

The 1st maxilliped (Fig. 7*l*, 7*m*) much differs from that of *Pasiphæa* Sav. In the first place the coxopodite and the basipodite are produced inward together as a prominent broad lobe, fringed with feathered setae on the outer margin, that bears a triangular notch or incision, so that it is divided into an anterior lobe, the basipodite, and a much smaller posterior, the coxopodite. The endopodite is also much more developed, its proximal half is much broader than the narrow distal half and covered with feathered setae on the convex outer margin. Beyond the rounded lobe of Boas the exopodite terminates in a broadly-foliaceous lobe, which is hardly one and a half as long as broad and fringed with long feathered setae. Epipodite very large, nearly as long as the exopodite.

The 2nd maxillipeds (Fig. 7*n*), that resemble those of *Lept. serratorbita*, differ also from those of *Pasiphæa*, because they are not pediform, the ischium and merus, as also the propodus, being much shorter and broader. The terminal or 7th joint (Fig. 7*o*) appears, however, as a proper dactylus, articulating, like in *Pasiphæa*, with the distal end of the propodus and not applied to it as a strip; the dactylus, a little broader than long and half as long as the propodus, terminates in a strong spine, one and a half as long as the joint itself, while both the outer and the inner margin of the latter are armed with 3 somewhat smaller spines and with a few setae; all these spines are fringed, along their margins, with microscopical setulae. The propodus has an oval form, is one-third longer than broad and the convex outer margin is armed with 5 or 6 spines and a few setae, while the inner is nearly straight. The merus is about one and a half as long as wide and narrows a little towards the carpal articulation, the ischium, finally, measures two-thirds the length of the merus and is nearly as long as broad. There is no exopodite.

Like in the male, also in the adult female the terminal joint (Fig. 7*q*) of the external

maxillipeds (Fig. 7*p*) is 6-times as long as wide, its inner margin is thickly beset with setae, while short setae are implanted on the outer; there are two longer setae at the distal end that measure about one-third the length of the joint.

Both in the adult male and the ova-bearing female the lower margin of the palm of the 1st pair of legs (Fig. 7*r*) is armed with 4, rarely 3, spines, while the upper is unarmed; in the adult male the palm is 1,4 mm. long and 0,56 mm. broad, in the ova-bearing female 1,3 mm. long and 0,54 mm. broad, the palm being almost 3-times as long as broad, as I already indicated in my work of 1902. In both sexes the outer margin of the dactylus bears 4 or 5 spines, like in *Lept. serratorbita*. Both in the male and in the female the carpus is 1 mm. long and 0,56 mm. thick distally, nearly twice as long as thick; it is armed on the middle of the lower margin with 2 spines and at the distal end with 2 or 3, one of which is a little larger than the two preceding, while the two other spines are successively smaller. Merus, both in the male and in the female, $2^1/_2$-times as long as the carpus and 4-times as long as wide; its lower margin is armed in the male with 4, in the female with 5 spines, both the upper and the lower margin are setiferous and there are 5 or 6 setae at the far end of the upper. Ischium almost just as long as the merus, also about 4-times as long as wide, slightly narrowing towards the proximal extremity, setiferous, but not armed with spines, except one at the distal end of the upper margin. Basipodite setiferous along the lower margin, with a single spine at the distal extremity. Exopodite just reaching beyond the far end of the merus.

The legs of the 2nd pair (Fig. 7*t*) show the same form and relative measurements as those of the 1st, but they are a little longer and a little more spiniferous. Dactylus with 5 or 6 spines. The carpus is armed with 4 or 5 spines on the lower side of the distal margin in both sexes and with 3 or 4 spines on the lower margin. The lower margin of the merus does not carry 4 or 5 spines, but in the male 7 and in the female even 9 and one observes moreover on the distal margin of this joint in the male one, in the female two small spines, and behind them on the outer surface 2 small spinules. There are 3 spines near the lower margin of the ischium and one observes on the basipodite, besides a spine at the distal end, still two on the proximal half of the lower margin. The exopodite, finally, is a little shorter than the ischium.

The peraeopods of the 3rd pair of the adult male agree with my description of 1902, except in the following. The dactylus is not precisely as long as the propodus, but one-sixth longer and 12-times as long as wide in the middle. The propodus is armed along its lower margin with 5 slender spiniform setae that slightly increase in length distally and with 2 at the far end, of which the longer measures three-fifths the length of the propodus. The ischium that slightly widens distally, is just as long as the merus, 4-times as long as wide at the far end and armed along the lower border with 4 short spines, while long setae stand on the upper. On the lower border of the basipodite 3 slender spines are implanted and the exopodite is a little shorter than the ischium. The 3rd legs of the female (Fig. 7*u*) agree with those of the male, but the propodus is almost twice as long as the carpus and furnished with 6 or 7 spiniform setae along the lower margin, besides the two at the distal extremity; the dactylus is sometimes nearly just as long as the propodus, but is also 12-times as long as wide in the middle. Exopodite just as long as the ischium.

Of the 4th legs of the male the ischium, that is 0,9 mm. or 1 mm. long, is armed on the lower margin with a strong spine, 0,76 mm. long, almost as long as the joint itself; some fine setae, the longest of which reach to the far end of the merus, occur along the distal half of the upper margin. Merus 1,3 mm. long and $2^1/_2$-times as long as broad; there is a spine in the middle of the lower margin and another just before it, while posterior to the spines 5 or 6 long setae are implanted; a tuft of long setae occurs along the distal half of the upper margin. Carpus 1,04 mm. long, presenting the greatest width at the distal 6th, nearly twice as long as thick; on the lower side of the distal margin 4 or 5 short spines are implanted, that decrease in length towards the articulation, like also some long setae. Propodus hardly shorter than merus, nearly twice as long as broad, lower margin with long setae, shorter ones along the proximal half of the upper. Dactylus hardly shorter than merus, 5-times as long as wide, with 10 or 11 spiniform setae along the three distal fourth parts of the posterior margin. Exopodite extending to the middle of the merus. The 4th legs (Fig. 7*v*) of the female resemble those of the male. In an adult ova-bearing female the ischium is 0,8 mm. long, 0,66 mm. broad, the large spine measures 0,82 mm.; the merus is 1,5 mm. long, 0,62 mm. broad, the carpus 1,2 mm. long, 0,55 mm. broad, the propodus 1,02 mm. long, 0,47 mm. broad, the dactylus, finally, long 0,86 mm., 0,24 mm. broad.

A long slender spine, measuring 0,52 mm., occurs, in the 5th leg of the male, on the lower border of the basipodite, not far from the distal extremity; the ischium is 0,94 mm. long and 0,64 mm. thick, one and a half as long as thick; a short spine occurs at the distal end of the upper margin, like also a tuft of setae, that extend almost to the far end of the merus, the lower margin bears also some setae, while a short conical spine exists at the distal extremity, nearly of the same size as the spine on the upper border. The merus, 1,3 mm. long and half as broad, bears a tuft of long setae at the distal end of the upper margin, while there are 2 or 3 spines on the lower. The carpus, 1,35 mm. long and 0,42 mm. broad at the distal end, is as long as the merus and is about 3-times as long as broad; it is armed with 2 or 3 spines near the distal end of the lower margin, while several setae are implanted along this margin, of which 4 or 5 of the longest reach almost to the end of the dactylus. The propodus is 0,86 mm. long and 0,36 mm. wide, $2^1/_2$-times as long as wide; the lower margin is furnished with several long strong setae, that extend beyond the dactylus and the latter, 0,75 mm. long, slightly shorter than the propodus, bears 7 or 8 spiniform setae along the two distal thirds of the lower margin.

In the female (Fig. 7*w*) the basipodite of the 5th legs bears a long spiniform seta, twice as long as the spine that occurs here in the male; there is no spine at the distal end of the upper border of the ischium, while the distal setae seem to be shorter than in the male and the spine at the distal end of the lower border is also smaller. Two spines are observed near the middle of the lower border of the merus, of which the posterior is a little longer than the other; these spines are longer and slenderer than the 2 or 3 that are here found in the male. The exopodite reaches to the middle of the ischium.

Ova very numerous, small, 0,5—0,55 mm. long.

The three specimens from Stat. 37 are nearly of the same size, hardly 7 mm. long;

in the middle, more obtuse anteriorly and posteriorly and not depressed in the middle, so that the upper border appears straight in a lateral view. The lateral carinae are straight, parallel with the middorsal crest; they are rounded, but, properly speaking, must be regarded as the lateral borders of the longitudinal grooves that exist on each side of the median carina, because they are not defined by any groove or depression on the outer side.

Like in *Lept. gracilis* Stimps. and in the form from Bass Strait, described in the Report on the Challenger Macrura under the name of *Lept. robusta*, the outer orbital angle terminates in a small acute spine, that is directed forward and the lower margin of which makes a right angle with the anterior border of the carapace; this spine is in the male a little larger than in the female. Anterior margin of carapace setiferous, antero-inferior angle obtuse.

In its general form the abdomen resembles that of *Lept. robusta* Stimps. The 5th somite (Fig. 8*a*) has the same shape, slightly compressed, the upper margin is blunt, but not carinate, its posterior extremity unarmed. The pleura of the 4th and 5th somite of the male carry a small obtuse tooth at the anterior end of their lower margin, but the posterior extremity is obtuse; in *Lept. robusta*, however, the antero-inferior angle of the pleura of these somites is rounded, without any trace of a tooth, while the postero-inferior angle of the pleura of the 5th somite is acute, dentiform. In the female specimens, however, this small tooth on the lower margin of the 4th and 5th pleura does not occur. Sixth somite as long as 5th and twice as long as wide in a lateral view, posterior and postero-lateral margin like in *Lept. robusta* Stimps.; the posterior margin on each side with a small spine, followed laterally by the postero-lateral angle, which is separated by a semicircular emargination from the subacute posterior extremity of the lower margin. The transverse tubercle at the base of the upper surface is little prominent. While one observes in *Lept. robusta* Stimps., near the posterior border of the lower surface of this somite, on each side but a small tooth, *Lept. pugnax* is armed, on the lower surface, on each side with a long, slightly curved, acuminate spine; this spine, that measures about one-fourth of the length of this somite, is implanted close to the lateral margin at the posterior third and reaches almost as far backward as the posterior extremity of that margin.

The telson, 2,1 mm. long in the ova-bearing female, just one and a half as long as the 6th somite, shows the same shape and measurements as that of *Lept. robusta* Stimps., but the upper surface is only armed with 2 pairs of spines. The spines of the basal pair are 0,25 mm. long and 0,16 mm. distant from one another, i.e. one-fourth the width of the telson, while they are implanted at the anterior ninth; the posterior pair occur just behind the middle, close to the lateral margins, and these spines are 0,17 mm. long. The armature of the tip with 5 pairs of spines is exactly the same as in *Lept. robusta* Stimps. and here also the margins of these spines are fringed with small denticles, except the outer margin of the spines of the 2nd and 3rd pair; the median spines, i. e. those of the 1st pair, are 0,32 mm. long, those of the 2nd pair 0,66 mm., those of the 3rd pair 0,58 mm. and hardly reaching beyond the median spines; the spines of the 4th pair are 0,33 mm. long and reach just beyond the extremity of the telson, the spines of the 5th pair, finally, implanted between those of the 2nd and 3rd, extend to the middle of the median spines and are 0,3 mm. long. The inner uropods reach backward as far as there where the spines of the 4th pair are implanted; they are fringed on both margins

with long feathered setae, while 4 slender subequal spines exist at the extremity of the outer margin close to one another. The outer uropods, that are hardly shorter, are armed on their outer margin with 10 or 11 spines and just inside the spine at the posterior extremity another occurs, which is 2 or 3-times as long and slightly arched.

Eye-peduncles short and stout, the dark slate-coloured corneae occupy more than half the length of the peduncle. The antennular peduncle reaches to the distal third of the scaphocerite. First article enlarged externally along its proximal half and from this enlarged part arises the pointed, spiniform stylocerite, which is just as long as the 1st article; this article, which on its proximal half appears almost as wide as it is long, bears, just in front of the eyes, on its upper surface near the far end a spiniform seta, directed upward. Second antennular article half as long as first and as long as thick, 3rd nearly one and a half as long as 2nd.

The scaphocerite, in the ova-bearing female 1,65 mm. long, is 4-times as long as wide, appears widest at the proximal 6th and hence gradually narrows, terminating in a short spine, 0,09 mm. long, $^1/_{18}$ the length of the scaphocerite; outer margin slightly concave.

The external maxillipeds much resemble those of *Lept. robusta* Stimps., but the terminal joint is a little shorter (Fig. 8*b*) in proportion to the penultimate and the longer of the two setae at the far end of the terminal joint is a little longer with regard to the length of this joint. In the ova-bearing female from Stat. 258 the penultimate joint is 0,76 mm. long, the terminal joint 0,54 mm. long and 0,1 mm. broad, the longer seta at the distal end 0,32 mm.; in the youngest male of *Lept. robusta* Stimps. from Stat. 313 these numbers are, in the same succession, 0,9 mm., 0,74 mm., 0,135 mm. and 0,33 mm. Like in *Lept. robusta* Stimps. the exopodite reaches just beyond the far end of the antepenultimate joint.

The thoracic legs also much resemble those of *Lept. robusta* Stimps. [1]). The measurements of the legs of the female from Stat. 261 are the following. Merus of 1st pair 5-times as long as wide, lower margin with 3 slender spines, that are half as long as the merus is wide, along the distal half and with some setae. Carpus almost half as long as the merus, twice as long as wide at the distal end, with 5 setae along the lower margin and a spine at the far end of it. Chela a little more than 3-times as long as the carpus; the palm which is a little more than half as long as the fingers and a little more than twice as long as broad, bears a spine at the distal end of the lower margin, on which 4 setae are implanted; 3 or 4 spiniform setae on the dactylus near the base.

Leg of 2nd pair (Fig. 8*c*) more spiniferous than those of 1st, like in *Lept. robusta* Stimps. A slender spine at the far end of the lower margin of the basipodite and two similar spiniform setae behind it at equal distances. Upper margin of ischium with several setae, a slender spine and a few setae at the distal extremity; lower margin with a spine in the middle and with another at the proximal third or fifth. Merus one-third shorter than ischium, 3,5—3,6-times as long as wide, lower margin with a spine near the proximal and another near the distal extremity, also one in the middle and with some setae between them; upper margin also setiferous. Carpus a little longer than one-third of the merus and in the middle a little wider than half the length; lower

1) In the diagnosis of *Lept. pugnax* (l. c. 1916, p. 149) the peraeopods are erroneously said to be of a more slender form.

margin with 2 spines and a few setae, while 5 or 6 unequal spines are implanted on the lower half of the distal margin. Chela 4-times as long as the carpus, palm half as long as the fingers, nearly half as wide as long; a spine at the far end of the lower margin, another in the middle, like also a few setae. Fingers like those of 1st pair.

Basipodite of 3rd legs (Fig. 8*d*) with 2 spiniform setae on the upper margin. Ischium slender, with 3 spines on the lower margin, one at the distal fifth, one a little behind the middle and one near the base; 4 or 5 strong long setae along the distal and some shorter ones along the proximal half of the upper margin. Merus a little more than half as long as the ischium, lower margin fringed with setae and with 3 spines, one not far from the distal extremity, the other at the posterior third, the last near the base. Carpus one-third of the merus, half as thick as long, lower margin with 6 long setae, that increase in length and of which the longest, at the far end, reaches beyond the middle of the propodus; there is also a strong spine, about half as long as the carpus, at the distal extremity. Propodus one and a half as long as the carpus, almost 5-times as long as wide, lower margin fringed with 10 long setae, resembling those of the carpus, upper margin also setiferous. Dactylus two-thirds of the propodus, nearly 5-times as long as wide, both margins with a few setae and three setae at the distal extremity, of which the longest is somewhat longer than the dactylus itself.

Basipodite of 4th pair with a strong spine, like in *Lept. robusta* Stimps. Ischium a little more than twice as long as wide, merus nearly as long as the ischium, carpus one-fourth shorter than merus, propodus little more than half as long as the carpus, merus, carpus and propodus almost 3-times as long as wide; dactylus one-third longer than propodus. All the joints of this leg are fringed on both margins with long stiff setae.

Basipodite of the legs of 5th pair with a short spine and a spiniform seta, which is twice as long. Ischium with a spine at the far end of the lower margin. Merus almost 3-times as long as wide, carpus nearly as long as the merus, about 3-times as long as wide distally, propodus a little more than half as long as the carpus, hardly more than twice as long as wide, dactylus one-third longer than propodus, slightly arched, slender, tapering to the acuminate extremity, 5-times as long as broad at base. The margins of this leg are fringed with long stiff setae.

The ova of the female from Stat. 258 are 0,4—0,5 mm. long and a little less broad. In his work on the Macrura of the Challenger Expedition, p. 862, Pl. CXXXIX, fig. 3 and 4 sixteen specimens, males and two egg-bearing females, from off East Moncoeur Island, Bass Strait, were referred by Spence Bate to *Lept. robusta* Stimps., in my opinion wrongly. Unfortunately the author confined himself, besides to a few remarks of little importance, to the translation of Stimpson's diagnosis, in which the words "carapax ecarinatus" were translated by "carapace carinated", a fault already indicated by Dr. Ortmann in his work "Decapoden und Schizopoden der Plankton-Expedition", 1893, p. 41. According to the figures 3 and 4, however, the species from Bass Strait differs from *Lept. robusta* Stimps. by the outer orbital angle being spiniform, not unarmed, obtuse; in fig. 3, the female, the antero-inferior angle of the carapace appears moreover also sharp, but in fig. 4, the male, obtuse, a difference to which I have already called attention in 1902 (Abhandl. Senckenb. Naturf. Gesells.). Bate's species differs, however, also from *Lept. pugnax* by its larger size, by the rostrum which is not turned upward

but downward, by the 6th somite of the abdomen being not armed with the large spine, characteristic of this species. Relying on the words "carapace carinated" of BATE's translation, we must assume that this is indeed the case in the south-australian *Leptochela*, though in the figures the carination is not visible.

3. *Leptochela* sp.

Stat. 7. March 11. 7° 55'.5 S., 114° 26' E. Reef. 1 young specimen.
Stat. 43. April 4/5. Anchorage off Pulu Sarassa, Postillon Islands. Depth up to 36 m. Bottom coral. 1 young specimen.
Stat. 181. Sept. 5/11. Ambon. 54 m. 1 young specimen.

These three specimens are all very young, that from Ambon is about 11 mm. long, the two others 8 or 9 mm.: they must probably be considered as varieties either of *Lept. pugnax* or of *Lept. robusta*. In the specimens from the Stations 7 and 43 the outer orbital angle is spiniform, but the spine is smaller than in *Lept. pugnax*, there is, however, also a short spine at the antero-inferior angle of the carapace. In both the rostrum is slightly upturned and reaches in the specimen from Stat. 7 just beyond the distal extremity of 1st antennular article, in the other almost to that extremity. The two spines on the lower surface of the 6th somite are implanted more backward than in *Lept. pugnax* and are as long as in young specimens of *Lept. robusta* from the Stations 37, 41 and 166, reaching to the posterior end of the lower margin; in both specimens two other somewhat shorter and thinner spinules of equal size are observed on the lateral margin of the 6th somite, one at the anterior third, the other in the middle. In the young specimen from Ambon the spine at the outer orbital angle has the same size as in *Lept. pugnax*, the antero-inferior angle of the carapace is rounded, but the spines on the lower side of the 6th somite, though implanted on the same place as in *Lept. pugnax*, are much shorter, nearly as in *Lept. robusta*.

they seem to belong to this species, but the spines on the lower surface of the 6th somite are larger than in the adult, reaching to the posterior extremity of the lateral margins.

The 7 young specimens from Stat. 41 agree with those from Stat. 37 as regards the length of the spines on the lower surface of the 6th somite; the largest is about 17 mm. long, the rest are much smaller.

The young male from Stat. 47 measures 19 mm., the spines on the lower surface of the 6th somite are already somewhat shorter than in the preceding younger specimens. The egg-bearing female from Stat. 105 is 18 or 19 mm. long, the spines on the lower surface of the 6th somite are already small, like in the adult.

The young sample from Stat. 109 measures hardly 15 mm., the carapace is rather much convex dorsally; it is no doubt a male, because the carinae are wanting.

The ova-bearing specimen from Stat. 114 is only 11 mm. long, the ova, however, have the same size as in the adult female; the carinae on the carapace are well developed.

The young male from Stat. 133 measures 18,5 mm., the male from Stat. 141 24 mm., in both the spines on the 6th somite are already nearly as small as in the adult. The young specimen from Stat. 166 is 13 mm. long; the spines on the 6th somite are large and reach almost to the posterior extremity of the lateral margins; this specimen differs also from the others by the outer orbital angle being rather acute, not rounded (Fig. 7*x*), though a spine does not occur, and by the anterior margin of the carapace running from the outer orbital angle straight and vertically downward.

The young male from Ambon is about 19 mm. long, spines of the 6th somite already nearly as in the adult.

The young specimen from Stat. 204 is $12^1/_2$ mm. long.

The young specimen from Stat. 285 measures 13 mm. The carapace is not carinate, the appendix masculina on the 2nd pleopods rudimentary.

The young male from Stat. 296 measures $12^1/_2$ mm. Carapace not carinate, appendix masculina on 2nd pleopods already present. There are only 2 pairs of spines on the upper surface of the telson, behind the anterior pair only one pair occurs, in the middle.

The 4 young specimens from Stat. 313 are all males, in each the 2nd pleopods bear an appendix masculina. The youngest is 12 mm. long. The dactylus of the legs of the 1st pair presents still only 2 spines, in this specimen, on the proximal half of its outer margin and 3 spines occur on the outer margin of the palm; the 2 spines at the distal end of the carpus are already present, but there is only one on the outer margin. Merus little more than twice as long as the carpus, 0,96 mm. long and 0,27 mm. broad, not yet 4-times as long as wide and with 2 spines on the distal half; ischium and basipodite like in the adult. The dactylus of the legs of the 3rd pair is still shorter than the propodus, only 0,34 mm. long and 8-times as long as wide in the middle; the 4 setae at the distal extremity are already present. Propodus one and a half as long as the carpus, 0,42 mm. long and 0,09 mm. broad, its lower margin still only with 2 setae, but the two at the far end are already developed and the longer extends almost to the truncate tip of the dactylus. Carpus one-fourth of the merus, armed and shaped like in the adult. Merus 4,6-times as long as wide, with 5 spines on the lower margin, ischium

still only with 3 spines on that margin, while the 3 slender spines on the basipodite are already developed. Legs of the 4th pair as in the adult. Merus 0,64 mm. long, 0,27 mm. broad, with 2 spines on the middle of the anterior margin, carpus long 0,52 mm. and 0,21 mm. wide, of the 4 spines on the distal margin only the two posterior are present; propodus 0,4 mm. long, 0,18 mm. broad, dactylus 0,34 mm. long. The exopodite reaches almost to the end of the ischium. Legs of the 5th pair like in the adult. The exopodite reaches to the middle of the ischium.

As the tricarinate form of the carapace of this species was not yet described by any author, we may assume that only the male has hitherto been observed.

The species, described by SPENCE BATE (Report Challenger Macrura) under the name of *Lept. robusta*, is evidently another, at first sight distinguished by the spiniform outer angle of the orbits. As regards *Lept. aculeocaudata* Paulson of the Red Sea, Dr. BALSS may be right when considering this form as identical with *Lept. robusta* Stimps.

General distribution: Chinese Sea (STIMPSON); Loo Choo Islands (STIMPSON); Hawaiian Islands (RATHBUN); Haddumati Atoll, Maldive Islands (BORRADAILE); Red Sea (BALSS).

2. *Leptochela pugnax* de Man. Pl. IV, Fig. 8—8*d*.

Leptochela pugnax J. G. de Man, in: Zoolog. Mededeelingen, uitgegeven vanwege 's Rijks Museum van Natuurlijke Historie te Leiden. Deel II, 1916, p. 148.

? *Leptochela robusta* C. Spence Bate, Report Challenger Macrura, 1888, p. 862, Pl. CXXXIX, figs. 3, 4.

Stat. 4. March 9. 7°42′ S., 114°12′.6 E. Anchorage off Djangkar (Java). 9 m. Bottom coarse sand. 1 adult male and 1 young specimen.
Stat. 41. April 3. 7°25′ S., 117°50′.5 E. Plankton, surface to 10 m. 1 young male.
Stat. 47. April 8/12. Bay of Bima, near south fort. 55 m. Bottom mud with patches of fine coral sand. 2 males.
Stat. 258. Dec. 12/16. Tual-anchorage, Kei-islands. 22 m. Bottom Lithothamnion, sand and coral. 1 ova-bearing female.
Stat. 261. Dec. 16/18. Elat, west coast of Great-Kei-island. 27 m. Bottom mud. 1 female without eggs.

A species of small size: the ova-bearing female is 14 mm. long from apex of rostrum to tip of telson, the other specimens are of the same size or a little younger. In the larger male from Stat. 47 the acuminate rostrum reaches, beyond the eyes, to the distal extremity of 1st antennular article; it arises with a rounded carina nearly at the anterior third of the carapace and is at first slightly directed downward to the middle of the corneae, while the rest is a little upturned; the rostrum proper is slightly compressed, though it is blunt and obtuse above. Posterior to the rostral carina the carapace, which is 4 mm. long, measured in the middorsal line, is smooth and rounded, the posterior emargination is as large as in *Lept. robusta*, its margin depressed, obvious.

Otherwise than in the male the carapace of the female appears, like in *Lept. robusta* Stimps. and *Lept. carinata* Ortm., tricarinate dorsally. The rostrum, more compressed than in the male, has for the rest the same form and length; the rostral carina is continued backward almost along the whole length of the carapace, viz. to the posterior seventh, where it gradually widens and passes into the upper surface of the carapace; the carina is compressed, subacute

Superfamily STYLODACTYLOIDA.

Family Stylodactylidae.

Stylodactylus A. M.-Edw.

The family Stylodactylidae, characterized by the second maxillipeds, of which the ischium and the merus seem to be coalesced to one joint, while the propodus seems to carry, according to a suggestion of Dr. Calman, a process that has become movable, so that in these maxillipeds two joints look as if articulating with the preceding one, and furthermore by the two first pairs of legs, in which, according to the Rev. Stebbing (South African Crustacea, Part VII, 1914, p. 50), "the palm has dwindled to the shortest span, and the long slender setose fingers lie so closely one upon the other that the ordinary function of chelae as grasping organs seems almost out of the question" — this family now contains at present six or seven species. The West Indies are inhabited by two, viz. *Stylod. serratus* A. M.-Edw. 1881, the first described of the family, and *Stylod. rectirostris* A. M.-Edw. 1883. *Stylod. serratus* was discovered by A. Agassiz off the island of St. Domingo at a depth of 524 fathoms and was afterwards taken by the U. S. Coast Survey Steamer "Blake" off the islands of Martinique and Nevis in 334 and 356 fathoms; according to the Rev. Stebbing this species should also occur off East London, Cape Colony, at a depth of 300 fathoms. The other, *Stylod. rectirostris*, was obtained, also by the expedition of the "Blake", off St. Lucia at 116 fathoms: this form was figured by A. Milne-Edwards in the "Recueil de Figures de Crustacés nouveaux ou peu connus" of April 1883, but has never been described.

Stylod. discissipes Bate 1888, with which *Stylod. orientalis* Bate 1888 is probably identical, occurs in the Pacific and was taken north of the Kermadec Islands at a depth of 600 fathoms and off the Hawaiian Islands in 230 to 53 fathoms. Another indopacific form is *Stylod. bimaxillaris* Bate 1888, taken by the "Challenger" off the Admiralty Islands at a depth of 150 fathoms, but also recorded from the Sagami Bay, Japan, where a female was obtained in 82 fathoms. The third indopacific species is *Stylod. Amarynthis* de Man, which is at present known from four different localities of the Indian Archipelago, the fourth and last, finally, the new *Stylod. Sibogae* de Man from the Sulu Sea taken at a depth of 285 fathoms.

LIST OF THE SPECIES OF THE GENUS STYLODACTYLUS A. M.-EDW., KNOWN AT PRESENT.

SPECIES	HABITAT	DEPTH IN FATHOMS
Amarynthis de Man 1902	Ternate	
	Between the islands of Wowoni and Buton	41—51
	Bay of Pidjot, Lombok	5—12
	Near 7° 0′ S., 120° 34′.5 E.	164—218
bimaxillaris Bate 1888	Off the Admiralty Islands	150
	Sagami Bay, Japan	82
discissipes Bate 1888	North of the Kermadec Islands	600
	Hawaiian Islands	230 to 53
orientalis Bate 1888.	North of the Kermadec Islands	600
rectirostris A. M.-Edw. 1883	St. Lucia	116
serratus A. M.-Edw. 1881	Off St. Domingo	524
	Off Martinique	334
	Off Nevis, Antilles	356
	East London, Cape Colony	300
Sibogae de Man 1918.	Sulu Sea	285

1. *Stylodactylus Amarynthis* de Man. Pl. V, Fig. 9—9*h*.

Stylodactylus sp. (amarynthis) J. G. de Man, in: Abh. d. Senckenb. naturf. Gesellschaft, Bd. XXV, 1902, p. 897, Taf. XXVII, fig. 64.

Stat. 33. March 24/26. Bay of Pidjot, Lombok. 9—22 m. Bottom mud, coral and coralsand. 1 young specimen.

Stat. 65a. May 6. Very near Stat. 65 (7° 0′ S., 120° 34′.5 E.). 300—400 m. Bottom pale, grey mud, changing during haul into coral bottom. 1 very young specimen.

Stat. 204. Sept. 20. 4° 20′ S., 122° 58′ E. Between the islands of Wowoni and Buton, northern entrance of Buton-strait. Depth from 75—94 m. Bottom sand with dead shells. One egg-bearing female.

Stylodactylus Amarynthis was founded in 1902 on an evidently young specimen from Ternate, the egg-bearing female from Stat. 204, however, must no doubt be referred to the same species, because the differences from the original description, chiefly as regards the characters of the rostrum, are certainly owing to this female being adult and full-grown.

The female from the northern entrance of Buton-strait is 20,2 mm. long from the extremity of the rostrum to tip of telson, just one and a half as long as the specimen from Ternate. The rostrum, 5,7 mm. long, measured from the orbital margin, is just twice as long as the rest (2,8 mm.) of the carapace, when measured dorsally; it is sloping downward for about two-thirds its length, while the distal third slightly ascends upward, though the acuminate apex does not extend to the level of the upper border of the carapace. The height of the rostrum along the basal half is $^1/_{15}$ of its length, but nearly from the middle it gradually narrows to the extremity. The upper margin (Fig. 9*a*) is armed with 14 spines, the lower with 5; the three anterior spines of the lower margin are slightly larger than the two preceding and than

the spines of the upper and all the spines apparently articulate with the rostrum. Four spines are placed behind the orbit, the 1st is a little smaller than the three following, its distance from the 2nd is just as long as that between the 2nd and the 3rd, but the 3rd is twice as far distant from the 4th as from the 2nd; the 5th spine is twice as far distant from the 4th as the 4th from the 3rd and the intervals between the 4th and the 5th, the 5th and the 6th and the 6th and the 7th are equal. The 8th spine is a little longer than the 7th and implanted close to it, then follows again a longer interval, for the 9th spine is one and one-third as far distant from the 8th as the 7th from the 6th; the distance between the 10th and the 9th is little more than one-third of the distance between the 9th and the 8th, but the 11th spine, a little smaller than the preceding and than the following, is as far distant from the 10th as the 9th from the 8th; the intervals between the four distal teeth are subequal, the distance between the two middle ones being a little larger than the distances between the 11th and 12th and between the 13th and 14th spine, while the 11th spine is as far distant from the 14th as from the 10th. The anterior spine, finally, is twice as far distant from the apex of the rostrum as the 12th spine from the 13th. The posterior spine of the lower margin is implanted opposite the 7th of the upper and the distances between the following gradually increase in length; the 2nd spine is placed a little before the 8th of the upper margin, the 3rd just before the 9th, the 4th midway between the 10th and the 11th, while the foremost spine is placed opposite the penultimate of the upper margin.

The carapace which is almost as high as long when measured dorsally, appears rather flattened above, especially the cardiac region, and the rostrum does not arise with a carina. Cervical groove shallow though distinct. Supraorbital spine situated a little below the 4th spine of the upper margin of the rostrum and reaching just beyond the orbital margin; outer orbital angle obtuse; the antennal spine that one observes close to and just below the outer orbital angle, is a little smaller than the supraorbital spine, there is, finally, a third spine directed forward and slightly downward at the antero-inferior angle of the carapace. Hepatic groove short, but continuing as a shallow groove towards the antero-inferior angle of the carapace. Orbital furrow rather indistinct. Lower border of carapace with feathered setae.

Apart from the characteristic spinulation of the pleura (Fig. 9*b*) and perhaps also from the shape of the telson, the abdomen closely resembles that of *Stylod. bimaxillaris* Bate: I say perhaps, because the telson of this species has not yet been figured, while the description is rather incomplete. The abdomen is 11,7 mm. long, 4-times as long as the carapace without the rostrum and nearly one-third longer than carapace and rostrum taken together. The abdomen is not compressed, so that the 1st and 2nd terga and the anterior half of the 3rd are more or less flattened, while the terga of the 4th, 5th and 6th somite are rounded. The upper border of the 3rd tergum which in the young specimen from Ternate (J. G. DE MAN, l. c. Fig. 64*a*) runs almost straight, appears in the adult specimen distinctly convex, like in *Stylod. bimaxillaris*. The 4th tergum, long 1,08 mm., appears, like in this species, about half as long as the 3rd, the upper border of the 5th is a little more than half as long (0,62 mm.) as the 4th, the 6th tergum, finally, 1,76 mm. long, is a little more than one and a half as long as the 4th and 3-times as long as the 5th, while the telson, about as long as the two preceding terga combined, is one and a half as long as the 6th somite. The general arrangement of the small spines or

teeth with which the pleura are armed, is substantially the same as in the young individual from Ternate, but owing to the female from Buton-strait being adult, the number of spines is a little greater or they are a little larger. The pleura (Fig. 9*b*) of the 1st somite are armed with 7 or 8 spines, 3 on the lower half of the anterior margin and 4 or 5 on the lower margin, arranged in two pairs that are separated by a somewhat larger interval. Six small spines occur anterior to the concave emargination of the lower margin of the 2nd pleura and four posterior to it, a somewhat larger spine exists on the lower half of the anterior margin and on that of the posterior: these two spines are directed downward. Eight or nine small, somewhat unequal spines are observed on the arched lower margin of the pleura of the 3rd somite, a larger spine, turned downward, is seen on the lower half of the posterior margin. Three small spines only exist on the lower border of the 4th pleura, between which one observes a few small prominences; a much larger spine, turned downward, occurs on the lower half of the posterior margin and this spine is also comparatively considerably larger than in the young specimen from Ternate. The narrow pleura of the 5th somite are beset inferiorly with 3 spines, that increase in length from the anterior to the posterior, so that the latter is 3-times as long as the former. The 6th somite which in a lateral view appears twice as long as high and, looked at from above, twice as long as broad, is armed on each side with three spines. When it is looked at from above, one observes one spine, turned backward and somewhat outward, at the outer angles of the slightly arched posterior margin, a second, directed laterally and slightly backward, at the anterior third of the somite and this spine is implanted on the lateral side of the latter, not far from the lower border. The third spine, that is also directed laterally and a little backward, is implanted, at the level of the anterior margin of the basal joint of the uropods, close to the lower border of the somite.

The telson (Fig. 9*c*), 2,8 mm. long, one and a half as long as the 6th somite and still a little longer than the 5th and the 6th taken together, resembles that of the young specimen from Ternate. At almost one-fourth its length from the base the telson shows its greatest width of 1,04 mm.; between this point and the base the lateral margins are a little concave, while posteriorly they strongly converge towards the tip. The telson ends (Fig. 9*d*) posteriorly in an acute median spine, 0,1 mm. long, on either side of which 3 articulating spines are implanted; the 1st next to the median spine, beyond which it reaches by about half its length, is 0,29 mm. long, the 2nd, 0,5 mm. long, is the longest of all and extends by more than half its length beyond the median spine, the 3rd, finally, 0,2 mm. long, is the shortest of the three and implanted at the posterior extremity of the lateral margins; from these extremities the lateral margins of the tip run obliquely to the median spine and the telson is here 0,33 mm. wide, one-third the greatest width anteriorly. The upper surface is broadly grooved from near the base to the tip and the 5 pairs of spinules are implanted on the borders of the groove. The spines of the 1st or anterior pair, 0,17 mm. long, are placed at one-fourth the length of the telson from the base, each spine twice as far distant from the middle line as from the lateral margins. The distance of the spinules of the 2nd pair from the base measures about one-third, viz. $^5/_{14}$, of the length of the telson and these spinules are just as far distant from one another as those of the 1st pair and are therefore placed a little closer to the lateral margins. The

spinules of the 3rd pair are placed, close to the lateral margin, nearly on the middle of the telson, at $^{15}/_{28}$ its length from the base, those of the 4th pair at the posterior third and those of the 5th pair, finally, are implanted near the lateral borders a little farther distant from the tip than from the 4th pair: the spinules of the four posterior pairs are as long as those of the foremost pair.

The outer uropods, just as long as the inner, are hardly shorter than the telson. The anterior border of the basal joint terminates laterally in an acute spine. The outer margin of the exopodite runs like a S, slightly convex anteriorly and armed here with 3 or 4 small, articulating spinules, slightly concave posteriorly and terminating in a small spine; at the inner side of this spine on the posterior margin another is observed, that is a little longer though also immobile and next to this a third articulating spine occurs, which is still a little longer. The rounded posterior margin passes with a regular curve into the inner margin and both are fringed with long feathered setae. The inner uropod is anteriorly almost just as broad as the outer but then suddenly narrows, while the outer border curves inward. The outer uropod is almost 3-times as long as wide in the middle, the inner 4-times; both the inner and the outer margin of the inner uropod are fringed with long feathered setae, except at the anterior enlarged part and a few feathered setae are implanted on the anterior half of the upper surface. According to the description of 1902 in the young specimen from Ternate the inner uropod did gradually narrow from before backwards and was only twice as long as wide in the middle.

The eyepeduncles, half as long as the carapace without the rostrum, extend to a little beyond the middle of basal antennular article; they are twice as long as the eyes are thick and the latter are provided with a small black ocellus, but not with a crown of long hairs as is the case in *Stylod. bimaxillaris*, according to Dr. Balss (Beiträge zur Naturg. Ostasiens. Ostasiatische Decapoden II. Die Natantia und Reptantia. München 1914, p. 27). There is a small forwardly directed spine on the upper border of the peduncle midway between the base and the cornea.

The antennular peduncle is nearly as long as the carapace without the rostrum and reaches about to the middle of the latter; the basal joint measures three-fourths the entire length of the peduncle and the stylocerite that is separated from the peduncle by a narrow interspace, is flattened, while its outer margin ends in an acute spine that reaches about to the middle of the peduncle, though it is shorter than the eyestalk. Second joint very short, measuring only $^1/_8$ or $^1/_9$ the length of basal article; it is a little broader than long and a spine, which is as long as the joint itself, is implanted at the distal extremity of the outer margin. The 3rd joint is one and a half as long as the 2nd and at the far end of the outer margin a similar spine occurs, which is a little longer than that of the 2nd joint. Inner flagellum 2,7 or 2,8 mm. long, as long as the carapace without the rostrum, hardly reaching beyond the latter; it seems to be composed of 13 or 14 articles and appears narrow and thin when looked at from above, but thicker in a lateral aspect. Outer flagellum a little shorter, much thicker though tapering distally, 13-jointed, the 3 or 4 terminal joints appearing narrow when looked at from above; olfactory filaments well developed, long.

Basal joint of outer antennae with a strong spine at the outer angle. Scaphocerite (Fig. 9*c*)

3,5 mm. long, one-fourth longer than the carapace without the rostrum, a little shorter than the latter; it is of a narrow shape, resembling a scimitar, the width being only one-seventh the length, and from the posterior third it gradually narrows, ending in an acuminate spine; the very concave outer margin is armed with 8 or 9 articulated spines, while the arched inner margin is fringed with long feathered setae. Antennal flagellum probably but a little more than half as long as the body.

The measurements of the 2nd maxillipeds (Fig. 9*f*) differ from those of *Stylod. bimaxillaris* Bate (Report Challenger Macrura, 1888, Pl. CXXXVIII, fig. 3*h*): these appendages are probably characteristic for each species of the genus. The long third joint, which consists probably of the two joints ischium and merus coalesced to one, is 1,22 mm. long, when measured along the outer margin, and 0,37 mm. broad in the middle, whence it slightly narrows towards both extremities; the following joint, evidently the carpus, is 0,35 mm. long and 0,27 mm. wide anteriorly; the next joint, which, like in *Stylod. bimaxillaris*, somewhat widens distally, is 0,96 mm. long, 0,44 mm. wide distally and 0,26 mm. proximally. The longer one of the two terminal joints is 0,75 mm. long and shows its greatest width of 0,26 mm. in the middle, being 3-times as long as wide; the inner margin runs slightly S-like, the outer is rather strongly arched; the other joint is 0,52 mm. long and half as wide in the middle, narrows, like the longer joint, towards both extremities, the inner margin is straight, the outer very convex. While in *Stylod. bimaxillaris* the joint, that follows the carpus, is only half as long as the third joint, in *Stylod. Amarynthis* it is much larger and measures four-fifths of the latter; the 3rd joint appears in *Stylod. bimaxillaris* of a more slender form and, while in Bate's species the longer of the two terminal joints shows a greater length than the preceding joint, in *Stylod. Amarynthis* it is shorter, measuring only about three-fourths of the probable propodus. The exopodite is 2,05 mm. long and reaches by the distal third of its length beyond the 3rd joint, while in *Stylod. bimaxillaris* it is only as long as this joint. As regards the long feathered hairs with which this maxilliped is provided, both species resemble one another, but in *Stylod. Amarynthis* only the two distal fifths of the exopodite are setiferous and those at the distal extremity are 1,2 mm. long, much longer than in Bate's figure.

The external maxillipeds extend by a little more than their terminal joint beyond the rostrum. The upper margin of the antepenultimate joint is unarmed and nearly glabrous, but on the middle of the outer surface 9 or 10 small spines are implanted, of which that on the distal extremity is a little longer than the preceding; the penultimate joint, which is 3,45 mm. long and 0,24 mm. wide, 14-times as long as wide, is armed with 4 or 5 small spines along the proximal half and with a somewhat longer spine, long 0,2 mm., at the distal extremity of the upper margin, a row of a dozen similar spines, 0,16—0,2 mm. long, are moreover implanted on the outer surface near the latter; the terminal joint, 2,92 mm. long, a little shorter than the penultimate, is 0,17 mm. wide at the base, from where it slightly tapers to the rather obtuse extremity; this joint is of a more narrow form than the penultimate and not spiniferous, its upper margin bears a few short hairs, but the lower margin is fringed with long setiferous setae, like the lower margin of the preceding joints.

The 1st pair of peraeopods extend by a little more than half the length of the fingers

beyond the rostrum, while the merus reaches as far forward as the antennal peduncle. The merus is apparently coalesced with the ischium to one single joint, that is 3,35 mm. long; the upper margin of this joint is glabrous and unarmed, but 9 or 10 articulating spines are implanted on the middle of the outer surface, of which spines one in the middle of the joint and one at the far end are a little larger than the rest. The carpus is 3,25 mm. long and nearly 12-times as long as wide in the middle, while it is a little wider at the distal extremity, where it is 0,3 mm. broad; the upper margin is armed with 9 spinules, of which the spine at the distal extremity, 0,2 mm. long, is the longest of all and almost as long as the joint is here wide, 9 partly somewhat longer spines are implanted on the outer surface near the upper margin. Chela 2,95 mm. long, a little shorter than the carpus; the very short palm, which is only 0,34 mm. long, appears in a lateral view near the articulation of the fingers 0,38 mm. broad and its posterior border is distinctly emarginate. The fingers are equal and in a lateral view gradually narrow to the apex, that is not acute, but obtuse, and 0,06 mm. broad; their upper border bears a few very small spinules, near each of which a short hair is implanted; in front of the described notch the posterior border bears a tuft of feathered, spiniform setae, while that border is fringed along its whole length with feathered setae, which at the base of the finger are 3 mm. long, at the apex 1,5 mm.

The legs of the 2nd pair are only as long as the rostrum. The coxopodite is armed with a spine at the far end of the posterior border. Like in the 1st pair ischium and merus seem to be united to one joint, that is 3,2 mm. long and 11-times as long as wide in the middle; the upper margin is glabrous and unarmed, except a spine, long 0,21 mm., at the distal extremity, while one observes a row of 5 spines on the outer surface, placed at unequal distances. The carpus is 2,65 mm. long and 0,25 mm. broad in the middle, 10—11-times as long as broad and a little widened at the distal extremity, like in the 1st pair; upper margin with 7 or 8 spines, while there is moreover a row of 7 spines on the outer surface near the upper margin. Chela 2,66 mm. long, just as long as the carpus; the propodus, which is less deeply notched posteriorly than in the 1st pair, is 0,27 mm. broad in a lateral view, one-tenth the length of the chela, for the rest the chela resembles that of the 1st pair and like in this all the joints are fringed with long feathered setae along the posterior border.

The three posterior legs are of a stout shape, those of the 3rd pair are a little shorter than the scaphocerite; they slightly decrease in length, so that the legs of the 5th pair reach only by their dactyli beyond the antennal peduncle. It remained doubtful whether also in these legs ischium and merus are coalesced to one joint or not. The meri that decrease in thickness from the 3rd to the 5th, are unarmed, excepting a strong spine at the far end both of the upper and the lower margin, but there are on the lower a few brownish, stout, feathered setae of moderate length. The carpi of the 3rd pair are 1,35 mm. long, measured along the anterior margin, which is armed with a small spine just beyond the middle and a smaller one just behind the middle; 4 or 5 spines are implanted on or near the posterior margin and one at the far end of the outer surface. The slightly curved propodi are 2 mm. long and 6 or 7-times as long as wide; their posterior margin is armed with 8 articulating spines, which from the 1st or posterior to the anterior somewhat increase in length, those on the distal half of the margin

being as long or even slightly longer than the joint is wide, 2 or 3 spines are moreover double. The dactyli (Fig. 9*g*), that resemble those of the genus *Caridina* H. M.-Edw., are 0,9 mm. long, almost half as long as the propodi and 4-times as long as wide at base; they are armed on their posterior margin with 5 stout spines, including the terminal claw, that increase in length from the 1st to the last. Carpus of 4th pair 1,23 mm. long, propodus 2,1 mm., the latter a little longer in proportion to the carpus than in the 3rd pair; there are 3 spines on the anterior border of the carpus but only one on the posterior near the distal extremity. Propodus 7-times as long as wide, with only 2 small spines on the proximal half of the anterior margin, but with 9 strong spines on the posterior margin, some of which are again double. The dactyli are 0,85 mm. long and fully resembly those of the 3rd pair, 4 spines, increasing in length, being implanted posterior to the terminal claw. Carpus of 5th pair 1,2 mm. long, propodus 2,32 mm. long, almost twice as long as the carpus; there are 4 or 5 spines near the anterior border of the carpus, one at the far end of the posterior margin, with a smaller spine behind it. Propodus of a slenderer form than those of the 3rd and 4th pair, 9-times as long as wide; there are 3 small spines on the proximal half of the anterior margin, while the posterior is armed with 11 articulating spines of somewhat unequal length, though generally becoming longer distally, the longer of the two spines at the distal extremity measuring 0,38 mm., one and a half as long as the propodus is wide. The dactylus (Fig. 9*h*) is 0,72 mm. long, about one-third of the propodus, and almost 4-times as long as wide at base; it is armed with 8 spines, including the terminal claw; these spines are of a less stout shape than those of the dactyli of the 3rd and 4th pair, but also increase in length from the proximal one to the terminal claw. Like the meri, also the carpi and the propodi of the three posterior legs are provided with a few feathered setae. Ova not very numerous, comparatively large, 0,65 mm. long and 0,4—0,48 mm. wide.

The two young specimens from the Stations 33 and 65*a* show nothing remarkable, but the meri and carpi of the 1st and 2nd pair of legs are still almost devoid of spines.

General distribution: Ternate.

2. *Stylodactylus Sibogae* de Man. Pl. V, Fig. 10—10*c*.

Stylodactylus Sibogae J. G. de Man, in: Zoologische Mededeelingen, uitgegeven vanwege 's Rijks Museum van Natuurlijke Historie te Leiden, 1918. Deel IV, afl. 3, p. 159.

Stat. 95. June 26. 5°43'.5 N., 119°40' E. Sulu Sea. 522 m. Stony bottom. 1 female.

A new species at first sight distinguished from the six other species of this genus by the lower margin of the rostrum being smooth, not denticulate. The only specimen collected measures 11,78 mm. from tip of rostrum to tip of telson; measured in the middle line the carapace proves to be 2,16 mm. long, the rostrum 1,38 mm., the abdomen 8,24 mm.: it is probably a young female. The rostrum (Fig. 10*a*), that measures two-thirds the length of the carapace, runs horizontally forwards to about the middle of the 2nd joint of the antennular peduncle; the upper border, slightly convex above the orbital margin, runs downward to the acuminate tip, while the lower margin is slightly concave. In a lateral view the rostrum, not including the teeth,

appears 0,28 mm. high at base, just one-fifth the length. While the lower margin is smooth and glabrous, the upper is armed with 16 teeth; the first six stand on the carapace, slightly increase in length from the 1st to the 6th and are, like the 5 or 6 following, separated by very short interspaces. Excepting the five distal ones, the rostral teeth are apparently all articulated and movable; those above the orbital margin and the eyes are a little larger than the first and the last. The foremost tooth is situated at one-fifth the length of the rostrum from the tip.

The carapace which is about one and a half as long as high, bears a small supraorbital spine like in *Stylod. Amarynthis*, an antennal and a branchiostegal spine; the antennal spine is a little larger than the two others. The abdomen, that is 6-times as long as the rostrum and 4-times as long as the carapace, appears a little more than twice as long as carapace and rostrum taken together. The third tergum, which is 1,32 mm. long, appears distinctly bent in a lateral view and somewhat prominent posteriorly. The 5th somite, 0,8 mm. long, is as long as the 4th; the 6th, 2,04 mm. long, is $2^1/_2$-times as long as the 5th and, being 0,62 mm. high in the middle, appears a little more than 3-times as long as high. Telson 1,65 or 1,7 mm. long, a little shorter than the 6th somite and armed at either side of the acute tip with 3 spines, of which the external is 0,1 mm. long, the following 0,4 mm., the submedian 0,2 mm.; 5 pairs of dorso-lateral spinules. The outer uropods reach as far backward as the terminal spinules of the telson, the inner are a little shorter. Different from *Stylod. Amarynthis*, but like in the other species of the genus, the abdominal pleura are unarmed, those of the 1st to 3rd are rounded, while the posterior angles of the 4th and 5th are subacute.

Measured from the orbital margin the cylindrical eyestalks appear almost half as long as the carapace, while they are half as thick as long; the semiglobular, distinctly faceted corneae measure two-thirds the length of the rest of the stalk, they are of a pale grayish colour, blackish near their posterior margin, especially at the outer side and without ocellus.

Antennular peduncle little shorter than the carapace, the proportion being like 7 : 9, very slender, 10 to 11-times as long as thick; the basal joint, that is strongly hollowed out above, is more than twice as long as the two following joints combined and the 2nd, that is a little longer than thick, appears about one and a half as long as the 3rd; outer flagellum much broader or thicker at base than the inner and tapering forward, inner flagellum cylindrical. Stylocerite lamellate, with acute tip, shorter than the eyestalks.

The antennal scale that measures five-sixths the length of the carapace and that reaches by about one-fourth its length beyond the antennular peduncle, has a narrow shape, the greatest width, proximally, being one-sixth the length; it regularly narrows distally to the truncate tip of the lamella, which is surpassed by the slender spine, into which the concave outer margin terminates. Antennal peduncle hardly longer than the eyestalks, of a stout shape.

The 2nd maxillipeds much resemble those of *Stylod. Amarynthis*. The 3rd joint, 0,8 mm. long and 0,22 mm. broad in the middle, is nearly 4-times as long as wide and narrows a little more towards the distal than to the proximal extremity; the outer margin bears a few setae and much longer feathered setae occur on the outer surface near the inner margin. Carpus short. The 5th joint, which is 0,54 mm. long, measures two-thirds of the 3rd and slightly widens distally, being at the distal extremity 0,21 mm. broad, as broad as the 3rd; at the far end of

the outer margin and elsewhere long feathered setae occur, that are curved inward. Of the two terminal joints one is 0,42 mm. long, a little shorter than the propodus and 3-times as long as broad in the middle; the other joint is little more than half as long and both are beset and fringed with long feathered setae.

The external maxillipeds that project by their terminal joint beyond the antennal scale and the peraeopods of the 1st and 2nd pair resemble those of *Stylod. Amarynthis*, but they are not armed with small spines; like in this species the lower border of their joints is fringed with the same long feathered hairs. The three posterior legs are more slender than those of *Stylod. Amarynthis*. The merus of the 3rd pair (Fig. 10*b*), 2,2 mm. long and 0,21 mm. broad, is nearly 11-times as long as broad and armed with a spine near the distal extremity of their lower margin, while nearly a dozen of simple hairs are implanted on the upper; the carpus measures one-third the length of the merus and is 4-times as long as thick at the far end; the propodus, 1,7 mm. long and 0,175 mm. broad, is one-fourth shorter than the merus and 10-times as long as broad, 6 small spines occur on its posterior border, that increase in length from the 1st to the 6th, while there is a small spinule on the middle of the posterior margin of the carpus; the dactylus (Fig. 10*c*), in *Stylod. Amarynthis* almost half as long as the propodus, measures in this species but one-fifth of the latter, it is $2^1/_2$-times as long as broad and armed with 3 spines posterior to the terminal claw. The legs of the 4th pair resemble those of the 3rd, those of the 5th pair, finally, are a little slenderer, but show for the rest also the same characters, even as regards the armature of the dactyli.

The exopodite of the 2nd pleopod is as long as the stalk or protopod, the endopodite but little shorter, the slender stylamblys, finally, provided with distinct cincinnuli, is a little longer than one-third of the endopodite.

Superfamily HOPLOPHOROIDA.

Family Hoplophoridae.

The family Hoplophoridae contains the seven genera *Hoplophorus* H. M.-Edw., *Systellaspis* Bate, *Acanthephyra* A. M.-Edw., *Ephyrina* S. I. Smith, *Notostomus* A. M.-Edw., *Hymenodora* G. O. Sars and *Gonatonotus* A. M.-Edw. As regards the genus *Meningodora* S. I. Smith, established in 1882 for a species, taken at 1632 fathoms off the east coast of the United States and which in 1888 was united by Spence Bate with the genus *Hymenodora* G. O. Sars, I would remark that in my opinion it must be identified, not with the genus *Hymenodora*, but with the genus *Acanthephyra* A. M.-Edw. The oral appendages, indeed, are just like in *Acanthephyra*, a fact already observed by S. I. Smith himself, for in his detailed description of *Meningodora mollis* (in: Bull. Mus. Comparat. Zoology, Vol. X, N° 1, Cambridge 1882, p. 74) this author says: the oral appendages are all very nearly as in *Miersia Agassizii* (i. e. in *Acanthephyra purpurea*), the differences being no greater in fact than might be expected between species belonging to the same genus. The endopod of the first maxilliped is composed of three segments and the two inner distal lobes of the second maxilla are narrow and project considerably beyond the basal lobe (S. I. Smith, l. c., Plate XII, Figs. 7 and 8), in *Hymenodora* G. O. Sars, on the contrary, the endopod of the first maxilliped is biarticulate and the two inner distal lobes of the second maxilla are broad and do not project beyond the basal lobe. It was the general appearance of *Meningodora mollis*, so conspicuously different from that of the species of *Acanthephyra*, known at that time, by the very thin and membranaceous integument and the very short rostrum, which no doubt has led to the establishment of this new genus. Nowadays, however, already three species of *Acanthephyra* are known in which the integument is similarly soft, thin and membranaceous and in which the rostrum is short, viz. *Acanth. brevirostris* S. I. Smith, *Acanth. rostrata* (Bate) and the interesting *Acanth. Sibogae*: the name of *Meningodora* may therefore be retained for that small section of *Acanthephyra*, in which those characters occur. In the Table of Species of *Acanthephyra* (Stanley Kemp, in: "Fisheries, Ireland, Sci. Invest., 1905, I., [1906], p. 23") *Acanth. mollis* must be classed in the third Section C, being related to *Acanth. Batei*.

Eight species of Hoplophoridae have been obtained by this expedition, they belong to

the genera *Hoplophorus*, *Systellaspis* and *Acanthephyra*: besides a new variety of *Acanth. media* Bate, a new species of this genus was discovered, presenting the same soft and membranaceous integument as *Acanth. brevirostris* S. I. Smith etc. and which therefore must be included in the now proposed section or subgenus *Meningodora*. Very interesting is also the only specimen of *Systellaspis debilis* (A. M.-Edw.), taken in the Halmaheira Sea, that proved to differ rather distinctly from the typical atlantic species and therefore has also been described as a new variety. As far as we know at present, the Indian Archipelago, including the Philippine Islands, is inhabited by one species of *Hoplophorus*, by one of *Systellaspis*, by ten species and two varieties of *Acanthephyra*, by three species of *Notostomus* and by one of *Hymenodora*, while species of *Ephyrina* and *Gonatonotus* have not yet been observed in these seas.

LIST OF ALL THE SPECIES OF HOPLOPHORIDAE, KNOWN AT PRESENT.

I. Genus **Hoplophorus** H. M.-Edw. 1837.

SPECIES	HABITAT	DEPTH IN FATHOMS	REMARKS
foliaceus Rathb. 1906 . . .	Hawaiian Islands	337 to 442	This species is perhaps identical with *Hopl. spinicauda* A. M.-Edw.
	Off the Farquhar Islands	500 to 0	
gracilirostris A. M.-Edw. 1881	St. Domingo	118	
	Off Morro Light	250—400	
	Off Dominica	108—250	
	Off St. Vincent	424	
	Off St. Vincent	464	
	Off Grenada	159	
	Off Bequia	458	
	Arabian Sea	406	
	Off the S. W. coast of India	237	
	Off Desroches Atoll	250 to 0	
	Bay of Bengal	145 to 1439	
	Andaman Sea	185 to 419	
	Hawaiian Islands	222 to 498	
Grimaldii Cout. 1905 . . .	West of Madeira	0—1093	
	North of Tristan da Cunha	5, 4	
longirostris Bate 1888. . .	Fiji Islands	610	Perhaps identical with *Hopl. gracilirostris* A. M.-Edw.
spinicauda A. M.-Edw. 1883		347	
typus H. M.-Edw. 1837 . .	North of New Guinea	1100	With this species *Hopl. brevirostris* Bate 1888 from off Tablas Island is certainly identical.
	Philippine Islands	700, 825	
	East of Saleyer	633	
	Flores Sea	874	
	Bali Sea	294, 579	
	Timor Sea	230	

II. Genus **Systellaspis** Bate 1888.

SPECIES	HABITAT	DEPTH IN FATHOMS	REMARKS
affinis (Faxon) 1896	Off Grenada	159	
cristata (Faxon) 1893 . . .	Gulf of Panama	1471, 1772	
	Arabian Sea	890	
debilis (A. M.-Edw.) 1881.	South of Iceland	From 411 to 2512	With this species *Acanth. gracilis* (S. I. Smith) 1882 is identical, while *Systell. Bouvieri* Cout. 1905 proved to be a young stage of *Systell. debilis*.
	West Atlantic between New York and the West Indies	On a few occasions adult specimens and larvae have been caught quite near the surface	
	From South of Iceland to the Bay of Biscay		
	South of the Azores		
	West of the Cape Verde Islands		
	South Atlantic (35° 39′ S., 8° 16′ W.)		
	Hawaiian Islands		
debilis (A. M.-Edw.) var. *indica* de Man 1916. . .	Halmaheira Sea		
echinurus Cout. 1911 . . .	Off the coast of Portugal	436	
lanceocaudata Bate 1888 .	Off Japan	345	

III. Genus **Acanthephyra** A. M.-Edw. 1881.

acutifrons Bate 1888. . . .	Aru Islands	800	The first of the three specimens described by BATE is considered to be the type, while STANLEY KEMP has pointed out in 1906 that two of the three belong probably to *Acanth. curtirostris* W.-Mas.
approxima Bate 1888 . . .	Sarmiento Channel, Patagonia		
approxima Faxon 1895 . .	Gulf of Panama	400	
	Galapagos Islands	458—1168	
armata A. M.-Edw. 1881.	Off Santa Lucia, West Indies	384	
	Off Frederikstaed, Santa Cruz, West Indies	422	
	Off Nevis, West Indies	450	
	Bali Sea	356	
	Strait of Makassar	694	
	Off Banda Island	655	
	East of Ceram	200	
	West of Salawatti	567	
	Kei-islands	798	
armata A. M.-Edw. var. *fimbriata* W.-Mas. 1894 . .	Arabian Sea	560	
	Bay of Bengal	406	
	Andaman Sea	475 and 594–225	
		405	

SPECIES	HABITAT	DEPTH IN FATHOMS	REMARKS
Batei Faxon 1895	South-west of Sierra Leone	1500	
	Equatorial Atlantic	1640	
	South of Iceland	400	
Braueri Balss 1914	Gulf of Guinea	0—2185	
brevirostris S. I. Smith 1885	Off the East coast of the United States	1395—2949	With this species *Hymenodora duplex* Bate 1888 is regarded to be identical by STANLEY W. KEMP 1906, while the validity of BATE's species is still maintained by COUTIÈRE 1911.
	Off the coast of Portugal (*duplex* Bate, teste COUTIÈRE 1911)	1640	
	Equatorial Atlantic	1600	
	Off Marion Island (*duplex* Bate)	1740	
	North coast of Ecuador		
carinata Bate 1888	Sarmiento Channel, Patagonia	400	
cucullata Faxon 1893 . . .	Gulf of Panama	1772	
curtirostris W.-Mas. 1891.	Arabian Sea	937—1043	
	Bay of Bengal	364—913	
	Andaman Sea	922	
	Flores Sea	1100	
	Manipa Strait	From 840 to surface	
	Entrance of Gulf of Boni	1062	
	South of Buton Passage	1350	
	From off San Diego, Calif. to off the Gulf of Panama	458—2232	
eximea S. I. Smith 1884 .	Off the east coast of the United States	938	With this species *Acanth. angusta* Bate 1888 and *Acanth. Edwardsii* Bate 1888 are identical.
	South of Pernambuco (*Edwardsii* Bate)	770	
	Arabian Sea	457—865	
	Bay of Bengal	561, 753	
	Andaman Sea	405, 498	
	Off Banda Island (*angusta* Bate)	200	
	Hawaiian Islands	339—1059	
eximea S. I. Smith var. *brachytelsonis* Bate 1888.	Cape Natal, South Africa	440	
	Arabian Sea	738—1000	
	Bay of Bengal	753 and 800–637	
	Andaman Sea	490—683	
	Siberut Island	0—955	
	North of Sumbawa	435	
	Timor Sea	452	
	Ceram Sea	456, 1040	
	Off the east coast of Ceram	310	
	Off Banda Island	200	
	South of the Philippine Islands	500	
	Off the Kermadec Islands	520—630	
	Japan	235, 345, 775	
	North of the Falkland Islands	2040	
Kempii Balls 1914	East of Ceylon	0—1366	

SPECIES	HABITAT	DEPTH IN FATHOMS	REMARKS
[1]) *Kingsleyi* Bate 1888 . . .	South-west of Sierra Leone	2500	
media Bate 1888	Off Tablas Island, Philippines	700	
media Bate var. *obliquirostris* de Man 1916	Halmaheira Sea	1013	
microphthalma S. I. Smith 1885	Off the east coast of the United States	2574, 2620	With this species *Acanth. longidens* Bate 1888 is regarded as identical; its validity is, however, still maintained by COUTIÈRE 1911.
	Off the coast of Portugal (*longidens* Bate)	.	
	Bay of Bengal	1748	
	Off the Philippine Islands (*longidens* Bate)	2150	
	South Pacific (*longidens* Bate)	2375	
mollis (S. I. Smith) 1882 .	Off the east coast of the United States	1106, 1632	For this species confer p. 41.
	Off Pernambuco	675	
	Off Portugal		
pulchra A. M.-Edw. 1890.	Mediterranean	690—1550	
purpurea A. M.-Edw. 1881.	Mediterranean	From 105 to 2949. It has once been taken, off the east coast of the United States, at the surface.	With this species *Acanth. Haeckelii* (v. Mart.) 1868, *Acanth. Agassizi* (S. I. Smith) 1882, *Acanth. sica* Bate 1888, *Acanth. rectirostris* Riggio 1900 and *Acanth. Bavei* Stebbing 1905 are identical, while *Acanth. parva* Cout. 1905 has proved to be a very young form of *Acanth. purpurea*.
	Adriatic		
	Northern Atlantic, both on the east and on the west side, from Davis Strait and Iceland to south of the Cape Verde Islands, though not yet observed in the West Indies.		
	Equatorial and southern Atlantic		
	North of the Falkland Islands		
	Cape of Good Hope		
	Indian Ocean, south of the Equator		
	South of Australia		
	Off New Zealand		
	Off the Kermadec Islands		
	Between Australia and the Solomon Islands		
	Indian Archipelago		
	South of Japan		
	Gulf of Panama		
	Coast of Ecuador		
purpurea A. M.-Edw. var. *acanthitelsonis* Bate 1888.	South-west of Sierra Leone	1500, 1850	
	Equatorial Atlantic	1640	
	South-west of the Azores	0—1093	
		0—1640	
rostrata (Bate) 1888	Near Torres Strait	1400	
	Philippine Islands	1050	
	North Pacific	2775	
sanguinea W.-Mas. 1892. .	Arabian Sea	295—1091	
	Bay of Bengal	1748	
	Andaman Sea	194—640	

1) In the Table of Species of *Acanthephyra*, published by STANLEY KEMP in: "Fisheries, Ireland, Sci. Invest., 1905, I., [1906], p. 24", *Acanth. Kingsleyi* has erroneously been placed in Section C, in which the rostrum is unarmed below; this remark is also applicable to a variety of *Acanth. brevirostris* S. I. Smith, recorded by FAXON from the north coast of Ecuador.

SPECIES	HABITAT	DEPTH IN FATHOMS	REMARKS
Sibogae de Man 1916 . . .	Entrance of Gulf of Boni	1062	
tenuipes (Bate) 1888	Coral Sea	1400	
Valdiviae Balss 1914. . . .	Southern Indian Ocean	0—1130	
	IV. Genus **Ephyrina** S. I. Smith 1885.		
Benedicti S. I. Smith 1885	Off the east coast of the United States	959	
	South-west of Ireland	0—700	
	Off Portugal		
	South of Japan	2425	
Hoskynii W.-Mas. 1891 . .	Arabian Sea	487, 740, 890	
	Bay of Bengal	800—637	
	Gulf of Gascony	656	
	South-west of Ireland	695—720	
	Off Portugal		
	V. Genus **Notostomus** A. M.-Edw. 1881.		
atlanticus Lenz 1914. . . .	West of the Cape Verde Islands	1640	
brevirostris Bate 1888. . .	Off Pernambuco	675	According to STANLEY KEMP this species is probably identical with *Not. perlatus* Bate 1888.
elegans A. M.-Edw. 1881 .	Gulf of Mexico	955	
	Off Portugal		
fragilis Faxon 1893. . . .	Off Cocos Island	770	
gibbosus A. M.-Edw. 1881	Grenada, Antilles	626	
japonicus Bate 1888	South of Japan	565	
longirostris Bate 1888. . .	Off Banda Island	1425	
Murrayi Bate 1888	Near Tristan da Cunha	1900	
patentissimus Bate 1888. .	South of the Philippine Islands	2150	
perlatus Bate 1888.	Near the Philippine Islands	2150	
	North of Chagos Archipelago	1200—0	
robustus S. I. Smith 1884.	Off the east coast of the United States	1309, 1555, 1582	
vescus S. I. Smith 1886. .	Off the east coast of the United States	2949	
Westergreni Faxon 1893 .	Coast of Ecuador	1740	
	Cape of Good Hope	800	
	VI. Genus **Hymenodora** G. O. Sars 1876.		
frontalis Rathb. 1902 . . .	From Bering Sea and Kamchatka to off Monterey Bay, Calif.	322 to 1771	
glacialis (Buchholz) 1874 .	Between Spitzbergen and Greenland	From	
	Färöe Channel	137 to 2949.	
	West of Ireland	Like *Acanth. purpurea* this species has once been taken at the surface.	
	Bay of Biscay		
	South-west of Liberia		
	Off the east coast of the United States		
	Off the west coast of America from the Bering Sea to Ecuador		

SPECIES	HABITAT	DEPTH IN FATHOMS	REMARKS
glauca Bate 1888	South of Australia	2150	
	South of the Philippines	2550	
mollicutis Bate 1888	2° 25′ N., 20° 1′ W.	2500	
	Near the Canary Islands	1675	
	Near Tristan da Cunha	1900	
	62° 26′ S., 95° 44′ E.	1975	
	53° 55′ S., 108° 35′ E.	1950	
	42° 32′ S., 56° 29′ W.	2040	

VII. Genus **Gonatonotus** A. M.-Edw. 1881.

crassus A. M.-Edw. 1881 .	Grenada, Antilles	262

Hoplophorus H. M.-Edw. 1881.

Oplophorus H. Milne-Edwards, Hist. Nat. Crust. II, 1837, p. 423.
Oplophorus C. Spence Bate, Challenger Crustacea Macrura, 1888, p. 760.
Hoplophorus A. Alcock, Catal. Indian Deep-Sea Macrura, 1901, p. 72.

The genus *Hoplophorus* H. M.-Edw., characterized by the strongly serrated outer edge of the antennal scale and by the foliaceous exopodites, with which the maxillipeds and the anterior or all the thoracic legs are provided, is represented by 5 or 6 species, that occur in the tropical and subtropical seas of both hemispheres. *Hopl. typus* H. M.-Edw., the first described species, hitherto only known from the Admiralty and Philippine Islands, was taken by the "Siboga" in various parts of the Indian Archipelago, East of the Island of Saleyer, in the Flores Sea, the Bali Sea and off the south coast of Timor. *Hopl. gracilirostris* A. M.-Edw., a beautiful species of a bright carmine pink colour, first discovered by the U. S. Coast Survey Steamer "Blake" off the island of St. Domingo and afterwards captured by the same expedition at a few other West Indian localities, occurs also in the Indian Ocean, the Arabian Sea, the Bay of Bengal and the Andaman Sea, and has even been observed near the Hawaiian Islands. *Hopl. longirostris* Bate, probably only a variety of *Hopl. gracilirostris*, was found by the "Challenger" off Kandavu, Fiji Islands. *Hopl. foliaceus* M. J. Rathbun, the third or fourth indopacific representative of this genus, is recorded both from the Hawaiian Islands in the Pacific and from the Farquhar Islands in the Indian Ocean. Still two other species are found in the Atlantic, viz. *Hopl. Grimaldii* Cout., a form closely related to *Hopl. gracilirostris*, observed west of Madeira and north of Tristan da Cunha, and finally *Hopl. spinicauda* A. M.-Edw., discovered by the "Travailleur", a species apparently closely allied to *Hopl. foliaceus*, but which is only known by a figure in the "Recueil de Figures de Crustacés nouveaux ou peu connus", published by A. Milne-Edwards in 1883.

The species of this genus are generally found in deep water, the maximum depth being 1439 fathoms, from which *Hopl. gracilirostris* was recorded in the Bay of Bengal; this form, however, occurs here also in 145 fathoms and is recorded from off the island of St. Domingo as living in 118 fathoms. I wish, however, to call attention to the remarkable observation,

made by the German Southpolar Expedition, October 31th 1901, when numerous specimens of *Hopl. Grimaldii* Cout. were caught north of Tristan da Cunha, in the night, in only 5,4 fathoms!

Key to the species of the genus *Hoplophorus* H. M.-Edw.

a_1 Third, fourth and fifth abdominal segments terminating in a spine.

b_1 Inner margin of antennal scale simple. A tooth at the postero-lateral angle of the carapace.

c_1 Rostrum about as long as the antennal scale, often a little shorter; spine of 3rd tergum, in adult specimens, hardly longer than that of 5th; lower angle of the pleuron of the 1st abdominal somite not produced to form a tooth . . *typus* H. M.-Edw.

c_2 Rostrum as long as up to $1^1/_2$-times the rest of the carapace; lower angle of the pleuron of the 1st abdominal somite, in the male, usually produced to form a tooth.

d_1 Spines of 3rd and 5th terga subequal . . . . . *longirostris* Bate.

(C. Spence Bate, Challenger Crustacea Macrura, 1888, p. 760, Plate CXXVII, fig. 2).

d_2 Spine of 3rd abdominal tergum, in adult specimens, very much longer than that of 5th . . . . . *gracilirostris* A. M.-Edw.

(A. Milne-Edwards, in: Annal. Sc. Nat., Zool. 1881, p. 6 and in: Recueil de Figures de Crustacés nouveaux ou peu connus, 1883, Pl. 29).

b_2 Inner margin of antennal scale with a barbed hook anteriorly. Rostrum $1^3/_4$-times as long as the rest of the carapace. No tooth at the postero-lateral angle of the carapace. Spine of 3rd tergum very much longer than those of 4th and 5th. . *Grimaldii* Cout.

(H. Coutière, in: Bulletin Mus. Océanogr. de Monaco, N° 48, 1905, p. 1).

a_2 Second, third and fourth abdominal somites terminating in a spine. No tooth at the postero-lateral angle of the carapace . . . . *spinicauda* A. M.-Edw.

(A. Milne-Edwards, Recueil de Figures de Crustacés nouveaux ou peu connus, 1883, Pl. 29).

foliaceus M. J. Rathbun.

(M. J. Rathbun, in: U. S. Fish Commission Bulletin for 1903, Part. III, Wash. 1906, p. 922, Pl. XX, fig. 8).

1. *Hoplophorus typus* H. M.-Edw.

Oplophorus typus H. Milne-Edwards, Hist. Nat. Crust. II, 1837, p. 424, Pl. 25bis, fig. 6, 7.
Oplophorus typus C. Spence Bate, Challenger Crust. Macrura, 1888, p. 762, Pl. CXXVII, fig. 1–1c.
? *Oplophorus brevirostris* C. Spence Bate, l. c., p. 766, Pl. CXXVII, fig. 3.

Stat. 17. March 17. 7° 28′.5 S., 115° 28′ E. Bali Sea. 1060 m. Bottom fine grey mud. 1 male.
Stat. 46a. April 7. 8° 0′.5 S., 118° 34′.7 E. Flores Sea. 1600 m. Bottom mud. 2 females, one of which is ova-bearing.
Stat. 211. September 25. 5° 40′.7 S., 120° 45′.5 E. East of Saleyer. 1158 m. Coarse grey mud, superficial layer more liquid and brown. 1 female.

Stat. 291. January 20, 1900. 9° 10'.3 S., 125° 55'.1 E. Timor Sea. 421 m. Bottom very fine, grey mud. 1 young female.

Stat. 316. February 19, 1900. 7° 19'.4 S., 116° 49'.5 E. Bali Sea. 538 m. Bottom fine, dark brown sandy mud. 1 young male.

The largest specimen, the female with eggs from Stat. 46a, measures 66 mm. from tip of rostrum to tip of telson, the carapace being 28 mm. long, the rostrum included, and 15 mm. without it. It fully agrees with Figure 1 of the "Challenger Macrura", but the rostrum is distinctly somewhat (3 mm.) shorter than the scaphocerites. The upper margin is 6-dentate, the 1st tooth, situated just midway between the orbital margin and the distal end of 1st antennular article, is microscopical, only visible by means of a strong magnifying glass, while the foremost tooth is placed midway between the 2nd and the apex of the rostrum; the lower border is armed along the middle third with 5 teeth, of which the 1st and the 5th are much smaller than the rest, that are equal. In the other female from this Station the rostrum appears just as long as in BATE's figure 1 and is $\frac{8}{5}$-dentate. In the young female from Stat. 211 which is 43 mm. long, the rostrum just reaches beyond the scaphocerites and is $\frac{1}{7}^{0}$-dentate; the two first teeth of the upper border are microscopical and the foremost tooth stands at one-sixth the length of the rostrum from the tip. Of the female long about 49 mm. from Stat. 291 the rostrum is as long as in the female from Stat. 211 and also armed with 10 teeth above, but the three first and the foremost one are microscopical; the lower margin, however, bears only 5 teeth. The rostrum of the male from Stat. 17 is broken off, this specimen, however, measured probably about 50 mm.; the other male from the Bali Sea has nearly the same size, the rostrum, as long as in BATE's figure 1, is $\frac{8}{6}$-dentate, but all the teeth of the upper border are well-developed. The length of the rostrum proves thus to be somewhat variable.

In the largest female from Stat. 46a the dorsal median carina appears rather sharp along the whole length of the gastric region, but in the other younger specimens it becomes gradually obtuse posteriorly near the cardiac region; a little posterior to the orbital margin the dorsal carina bears a small circular impressed point and appears here a little higher. On the cardiac region the carina is rather obtuse, somewhat widened in the middle and in the largest specimen, the ova-bearing female from Stat. 46a, even flattened. On either side this widened part of the carina carries 2 or 3 small tubercles and a few small tubercles exist also, on either side of the carina, on the dorsal surface of the cardiac region, which is separated from the gastric region by a shallow transverse groove. The spine at the postero-lateral angle of the carapace is not straight, as figured by BATE, but slightly curved, directed backwards and outwards; it appears also comparatively a little shorter than in Figure 1 of the „Challenger Macrura".

Hoplophorus typus is pretty well characterized by the form and the relative length of the three dorsal spines of the abdomen, that are accurately figured in BATE's figure 1. The spine of the 3rd tergum is constantly longer than that of the 5th, rather little longer in adult, but much longer in younger individuals, also less slender, somewhat thicker or higher at the base; the spine of the 4th tergum is always distinctly shorter than the two others and more or less regularly curved. The two first somites and the triangular anterior part of the

dorsal carina of the 3rd somite are dorsally flattened. The lower margin of the 1st abdominal pleuron is truncate, straight and makes an obtuse angle with the anterior margin, which is rounded anteriorly, but which in the two females from Stat. 46a appears very slightly concave or excised near the lower angle, exactly as in BATE's figure 1; in the two young females from the Stations 211 and 291 the anterior margin of the 1st pleuron is little more emarginate, but in the two male specimens the excision is deeper and more pronounced, though neither in the male nor in the female specimens the lower angle is produced like a tooth, as is usually the case in *Hopl. gracilirostris* A. M.-Edw. Though the two male specimens are perhaps not yet full-grown, it seems, however, quite probable that in *Hopl. typus* the lower angle is never dentiform, a character by which this species should differ from *Hopl. gracilirostris* and *Hopl. longirostris*.

In the largest specimen, the ova-bearing female long 66 mm., the external maxillipeds project by half their terminal joint beyond the antennal peduncle, the legs of the 1st pair reach almost as far forward as that peduncle, those of the 2nd and 3rd are hardly shorter and the legs of the last pair extend as far as the antero-lateral angle of the carapace. There is a small spine near the distal extremity of the lower margin of the merus of 3rd legs.

Ova large, 3 mm. long and 2,5 mm. broad.

Hopl. brevirostris Bate is no doubt identical with this species, for it only differs by the shorter rostrum, the rostrum, however, is proved by the preceding to be variable. *Hopl. gracilirostris* A. M.-Edw. differs from *Hopl. typus* H. M.-Edw. by the longer rostrum, by the spine of the 3rd abdominal tergum being very much longer than those of the 4th and 5th and by the anterior border of the pleuron of the 1st abdominal somite being deeply excised in the male with the lower or posterior angle of the notch pronounced and usually produced (A. ALCOCK, l. c. 1901, p. 74). *Hopl. longirostris* Bate seems to differ from *Hopl. gracilirostris* only by the three spines of the abdomen being of equal length and should perhaps be regarded as a variety.

General distribution: New Guinea (H. MILNE-EDWARDS); North of New Guinea (SPENCE BATE); Philippine Islands (SPENCE BATE).

Systellaspis Bate.

The genus *Systellaspis* Bate, the validity of which has been clearly demonstrated by Professor COUTIÈRE, includes at present 5 species and 1 variety. *Systell. debilis* (A. M.-Edw.) is distributed throughout the Atlantic, both on the east and on the west side, from South of Iceland to near Tristan da Cunha, but a solitary specimen has also been taken in the vicinity of Kauai Island, one of the Hawaiian Islands. Another specimen was obtained by the "Siboga" in the Halmaheira Sea; this specimen, however, presents some differences from the typical species, so that it is described as a new variety. In view of this fact it is to be regretted that not any observation concerning the Hawaiian specimen has been published, because its characters have perhaps been the same as those of the female from the Halmaheira Sea. *Systell. lanceocaudata* Bate, the type species of the genus, was obtained by the "Challenger" off Japan, but only one specimen, a female, was taken. Still a third species is known from the Indopacific,

namely *Systell. cristata* (Faxon), a single specimen of which was dredged in the Arabian Sea, while this form was for the first time captured in the Gulf of Panama. *Systell. affinis* (Faxon) is only known from off Grenada, one of the Antilles, *Systell. echinurus* Cout., finally, only from off the coast of Portugal.

As regards the variability of the vertical range the genus *Systellaspis* resembles the genus *Acanthephyra*. While *Systell. affinis* Faxon, *Systell. lanceocaudata* Bate and the variety *indica* of *Systell. debilis* (A. M.-Edw.) were obtained at less than 500 fathoms, *Systell. cristata* (Faxon) was found at 890 fathoms in the Arabian Sea, but in the Gulf of Panama even at 1471 and 1772 fathoms. *Systell. debilis* (A. M.-Edw.) has the same vertical range as *Acanth. purpurea* and on a few occasions adults and larvae have been captured quite near the surface. The depth at which *Systell. echinurus* Cout. occurs, has not been recorded.

1. *Systellaspis debilis* (A. M.-Edw.), var. *indica* de Man. Pl. VI, Fig. 11—11*f*.

Systellaspis debilis (A. M.-Edw.), var. *indica* J. G. de Man, in: Zoolog. Mededeelingen, uitgegeven vanwege 's Rijks Museum van Natuurlijke Historie te Leiden. Deel II, Afl. 3 en 4, 1916, p. 151.
Acanthephyra debilis A. Milne-Edwards, in: Annal. Sc. Natur. (6. Sér.), Vol. XI, 1881, p. 13.
Acanthephyra debilis Stanley W. Kemp, Fisheries, Ireland, Sci. Invest., 1905, I., [1906], p. 16, Pl. II, Fig. 4—7 and 1908, I. [1910], p. 59, Pl. VI, figs. 1—15 (Synonymy).
Acanthephyra debilis M. J. Rathbun, in: U.S. Fish Commission Bulletin for 1903, Part III, Wash. 1906, p. 922.
Acanthephyra debilis H. Lenz and K. Strunck, Deutsche Südpolar-Expedition 1901—1903, T. XV, Zoologie VII, Berlin 1914, p. 327.

Stat. 161. August 17. 1° 10'.5 S., 130° 9' E. Halmaheira Sea. 798 m. Bottom muddy sand. 1 egg-bearing female.

Only one other specimen of this remarkable species which is distributed throughout the Atlantic, has hitherto been observed in the Indopacific, namely a specimen which was taken near Kauai Island, one of the Hawaiian Islands, at a depth of 478 to 453 fathoms (M. J. Rathbun, l. c.): unfortunately no remarks about it are given, so that it remains uncertain whether that specimen has shown the same discrepancies from the typical atlantic species as our female from Stat. 161, which therefore is considered as a variety *indica*.

The well-preserved female, obtained by the "Siboga", measures 94 mm. from apex of rostrum to end of telson and in most characters agrees with the detailed and excellent descriptions and figures published by Stanley Kemp. The rostrum, 24,5 mm. long, one and a half as long as the carapace (15,75 mm.), is strongly curved upwards, much more than in the atlantic species according to the figures in the "Recueil" of 1883 and in Stanley Kemp's papers, so that the vertical distance between the apex of the rostrum and the upper margin of the cephalothorax measures two-thirds the height of the latter; the upper border of the rostrum appears therefore obviously concave, the lower obviously convex. The basal crest is armed with 4 teeth, the first three increase in size, while the 4th is as large as the 3rd, which is placed above the orbital margin; the rostrum proper is armed above with 9 evenly-spaced teeth of equal size, that are as large as the 2nd tooth of the basal crest. The 1st of these nine teeth is almost

one and a half as far distant from the 4th tooth of the basal crest as the 4th from the 3rd and the anterior tooth of the upper margin is one and a half as far distant from the penultimate as from the apex of the rostrum. The lower border is armed with 10 teeth, of which those on the middle are more closely set together than the 2 or 3 first and the 2 or 3 last ones; the 1st tooth stands just before the 2nd of the upper margin, the 7th tooth is paired with the antepenultimate, while the foremost is situated midway between the apex of the rostrum and the anterior tooth of the upper margin.

The carina of the 3rd abdominal somite does not commence at the anterior margin, but a little about 1 mm. — behind it and is at first rather low, though gradually rising to a more compressed carina; the spine of the 3rd tergum measures one-third the length of the 4th somite. The two following somites are dorsally obtuse, the spine of the 4th tergum is much smaller than that of the 3rd and measures only one-fifth of it, the spine of the 5th tergum, finally, is very small, only half as long as that of the 4th; the fine notch on the 4th tergum is situated at the posterior fifth. The 6th somite that is unarmed posteriorly, is 10 mm. long, a little more than one and a half as long as the 5th, that measures 6 mm. The dorsal portions of the postero-lateral margins of the 4th and 5th somite are spinulose, but the spinules are a little smaller than in KEMP's figure 1 on Plate VI of his work of 1910; the 4th somite has on the left side 6, on the right 7 spinules, the 5th on the left side 4, on the right 5 spinules and on each side the lowermost spinule or the lowermost but one is a little larger than the rest. The telson, which is slightly grooved dorsally, except the anterior fourth, is 13,25 mm. long, one-third longer than the 6th somite, and reaches a little, viz. 0,5 mm., beyond the exopodites of the caudal fan, when stretched backward. The terminal cluster of spines agrees with KEMP's description of 1910 and there are four pairs on the lateral sides of the telson, the anterior or 4th pair just before the middle, the 3rd pair as far distant from the 4th as from the 1st, the 2nd just midway between the 1st and the 3rd.

According to KEMP's description of 1910 the antennular peduncle should be very short and only reach to about one-third the length of the antennal scale, in the female from the Halmaheira Sea, however, it extends almost to the middle, viz. to $^{10}/_{23}$ of the length of the scale. The antennal scale, 11,5 mm. long, proves to measure five-sevenths the length of the carapace (15,75 mm.), measured between the orbital and the posterior margin, not five-sixths as in the atlantic species.

The legs of the 3rd pair are the longest of all and almost reach to the end of the antennal scales, being only 1 mm. shorter; the propodus (5 mm.) is not "at least three times" (KEMP, l. c. 1910), but little more than twice as long as the carpus (2,3 mm.) — in the 4th] pair these numbers are 5 mm. and 2 mm. — and of both legs the propodus slightly tapers distally in a lateral view. In both the 3rd and the 4th pair the dactylus measures about four-fifths, not "about two-thirds" the length of the propodus. The legs of the 4th pair reach to the distal third of the antennal scales, those of the 5th pair, finally, are the shortest of all, projecting only by half their dactyli beyond the distal extremity of the carpus of the 4th pair.

General distribution: As already indicated by Mr. KEMP, four isolated specimens, one male, two females, one of which with eggs, and still a fourth specimen have been taken

between New York and the West Indies (A. Milne-Edwards, S. I. Smith and W. Faxon). A single specimen has been observed South of Iceland in Lat. 62° 47′ N. (Hansen). In the N. E. Atlantic numerous specimens have been obtained by the Danish fishery steamer Thor and by the s. s. Helga in the Atlantic trough over an area ranging from the Färöe Islands to the Bay of Biscay (Hansen, Kemp). Three female specimens, one of which was immature (*Systellaspis Bouvieri* Cout.), were captured near the Azores (Coutière), while it is recorded by Hansen from the mouth of the English Channel and from off the Brittany coast. This species has been taken by the German Southpolar-expedition 1901—1903 west of the Cape Verde Islands and at Lat. 28° 42′ N., Long. 34° 33′ W., but also in the South Atlantic at Lat. 35° 39′ S., Long. 8° 16′ W., (Lenz and Strunck).

As already mentioned, a solitary specimen is known from the Pacific, namely from the vicinity of Kauai Island, one of the Hawaiian Islands (Rathbun).

Acanthephyra A. M.-Edw.

The genus *Acanthephyra*, established by A. Milne-Edwards in 1881, is nowadays represented by 21 species and 4 varieties, the greater part of which have been observed either in the Indopacific or in the Atlantic or on the west coast of America, but some species of this deep-water genus are more widely distributed, occurring both in the Indopacific and the Atlantic or both in the Indopacific and off the west coast of America, or on both sides of the new world, *Acanth. purpurea* A. M.-Edw., finally, shows an almost world-wide range. This nice species, easily recognizable by the long slender rostrum, armed dorsally throughout its whole length, straight or slightly upturned, and by some other characters, occurs, indeed, not only in the Mediterranean and in the whole Atlantic from Davis Strait and Iceland to the Falkland Islands, but has also been taken in the Indian Ocean south of the Equator, the Indian Archipelago, south of Australia, off Japan and even in the Gulf of Panama and on the coast of Ecuador; as far as I am aware, it has, however, not yet been captured in the West Indies, in the Red Sea and in the Indian Ocean north of the Equator, being represented in the Arabian Sea, the Bay of Bengal and the Andaman Sea by the closely allied *Acanth. sanguinea* W.-Mas. The first described species, *Acanth. armata* A. M.-Edw., known from the West Indies, was obtained by the "Siboga" at five different Stations, far distant from one another, of the Indian Archipelago, though it was already recorded from off the island of Banda by the "Challenger". A similar distribution shows *Acanth. eximea* S. I. Smith, which is moreover known from south of Pernambuco and from the Hawaiian Islands, its variety *brachytelsonis* Bate is distributed throughout the Indopacific from the Arabian Sea to the Kermadec Islands and Japan, but is also recorded from north of the Falkland Islands. The third and last species, known both from the Indopacific and the Atlantic, is *Acanth. microphthalma* S. I. Smith. *Acanth. curtirostris* W.-Mas. is the only species that occurs as well in the Indopacific as on the west coast of America, while *Acanth. (Meningodora) brevirostris* S. I. Smith is the only form found both on the east and on the west side of the New World, though the solitary specimen recorded from the west side, a male taken off the north coast of

Ecuador, did not fully agree with the typical species from the east side, as FAXON has pointed out. *Acanth. pulchra* A. M.-Edw. occurs in the Mediterranean, but was not yet observed outside of it.

Acanth. (Meningodora) mollis (S. I. Smith), *Acanth. Batei* FAXON, *Acanth. Braueri* Balss and *Acanth. Kingsleyi* Bate are four species, which hitherto have only been observed in the Atlantic: the first is found off the east coast of the United States, off the coast of Portugal and off Pernambuco, while the three others occur in the Gulf of Guinea, though *Acanth. Batei* has also been taken south of Iceland. The variety *acanthitelsonis* Bate of *Acanth. purpurea* A. M.-Edw. is also only known from the tropical part of the Atlantic. Two species, *Acanth. carinata* Bate and *Acanth. approxima* Bate occur in Sarmiento Channel on the west coast of Patagonia: the former has not yet been found elsewhere, but *Acanth. approxima* occurs perhaps also in the Gulf of Panama. The third of the three species which are found on the west coast of America, but not elsewhere, is *Acanth. cucullata* Faxon from the Gulf of Panama.

Eight species and 2 varieties are at present known to occur in the Indopacific, though not elsewhere. *Acanth. acutifrons* Bate has only been taken off the Aru Islands and *Acanth. media* Bate only near one of the Philippine Islands, but a remarkable variety *obliquirostris* of the last named form was discovered by the "Siboga" in the Halmaheira Sea. An interesting new species, *Acanth. (Meningodora) Sibogae*, has also been captured by this expedition in the entrance of the Gulf of Boni, it belongs to that small section of the genus in which the integument is soft and membranaceous and for which, p. 41, the name of *Meningodora* was proposed. *Acanth. tenuipes* (Bate) has only been recorded from the east coast of Cape York Peninsula. The Indian Ocean, north of the Equator, is inhabited by *Acanth. sanguinea* W.-Mas., *Acanth. Kempii* Balss and by the variety *fimbriata* W.-Mas. of *Acanth. armata* A. M.-Edw., while the typical species occurs both in the Indian Archipelago and off the east coast of the United States; *Acanth. Valdiviae* Balss is only known from the southern Indian Ocean, *Acanth. (Meningodora) rostrata* (Bate), finally, has been recorded not only from the north Pacific and the Philippine Islands, but also from Torres Strait.

From the List of localities at p. 43—46 we may conclude that no less than 10 species with 2 varieties are at present known to inhabit the Indian Archipelago, 4 species and 1 variety of which have not yet been observed elsewhere, so that just half the number of all the known species of *Acanthephyra* prove to occur in this Archipelago. Four species and varieties of two other ones were obtained by the Siboga expedition, of which *Acanth. curtirostris* W.-Mas. was not yet known to occur in the Indian Archipelago, while *Acanth. Sibogae* and a variety of *Acanth. media* Bate proved to be new to science.

Concerning the vertical range it may be allowed to refer to the List at page 43—46, from which it results that the depths at which the species of *Acanthephyra* occur, vary rather considerably. While some, like *Acanth. armata* A. M.-Edw. and its variety *fimbriata* W.-Mas., *Acanth. acutifrons* Bate etc., were dredged in less than 1000 fathoms, other species as e. g. *Acanth. brevirostris* S. I. Smith, *cucullata* Faxon and *microphthalma* S. I. Smith were taken in considerably deeper water. The depth at which some species occur, varies also rather much. So e. g. *Acanth. purpurea* A. M.-Edw., an almost cosmopolitan species, which was trawled off

the east coast of the United States in such shallow water as 105 fathoms, but which north-west of Bermuda was taken at 2675 and off the east coast of the United States even at 2949 fathoms, this depth being the greatest recorded for this genus. In most of these cases, however, as Stanley Kemp suggests in his paper of 1906, the specimens may have been caught while the trawl was being hauled to the surface. Many species occur probably in a vast region intermediate between the surface and the bottom and may sometimes approach the surface, as e. g. the already mentioned *Acanth. purpurea*, of which a specimen has once been captured alive at 10,45 p. m. at the surface, a fact recorded by S. I. Smith (in: Annual Report of the Commissioner of Fish and Fisheries for 1885. Wash. 1886, p. 63). Other species, however, with less developed, smaller eyes, like *Acanth. microphthalma* S. I. Smith and *Acanth. brevirostris* S. I. Smith, are on the contrary constantly found in much deeper water and probably never reach the surface.

1. *Acanthephyra eximea* S. I. Smith, var. *brachytelsonis* Bate.

Acanthephyra brachytelsonis C. Spence Bate, Challenger Crust. Macrura, 1888, p. 753, Pl. CXXVI, fig. 7.
Acanthephyra brachytelsonis J. Wood-Mason and A. Alcock, in: Annals Mag. Nat. Hist. Sixth Series, Vol. 9, May 1892, p. 362.
Acanthephyra eximia var. *brachytelsonis* A. Alcock, Catal. Indian Deep-Sea Crustacea, Calcutta, 1901, p. 78.
Acanthephyra brachytelsonis Th. R. R. Stebbing, South African Crustacea, Part VIII, London, 1915, p. 97 (in: Annals South African Museum, XV, Part II, 1915).
Illustrations of the Zoology of the Investigator, Pl. III, fig. 2.

Stat. 45. April 6. 7° 24′ S., 118° 15′.2 E. 794 m. Bottom fine grey mud, with some radiolariae and diatomes. 1 young specimen.
Stat. 173. August 28. 3° 27′.0 S., 131° 0′.5 E. Off the east coast of Ceram. 567 m. Bottom fine, yellow grey mud. 2 young specimens.
Stat. 175. August 30. 2° 37′.7 S., 130° 33′.4 E. Ceram Sea. 1914 m. Bottom fine, grey and green mud. 1 young male (the carapace with appendages only).
Stat. 178. Sept. 2. 2° 40′ S., 128° 37′.5 E. Ceram Sea. 835 m. Bottom blue mud. 2 almost adult males and 3 very young specimens.
Stat. 284. January 18, 1900. 8° 43′.1 S., 127° 16′.7 E. Timor Sea. 828 m. Bottom grey mud. 1 fully developed specimen.

The adult specimen from Stat. 284, which seems to be a female without eggs, because there is but one stylet at the base of the endopod of the 2nd pleopods, is 153 mm. long, still 11 mm. longer than the largest specimen recorded (Alcock, l. c. 1901): the rostrum, measured obliquely from the orbital margin to the apex, proves to be 24 mm. long, the carapace 39 mm., the abdomen 90 mm. The upper border of the rostrum that reaches to the terminal 5th part of the antennal scales, is at first slightly directed downward as far as the distal extremity of the antennular peduncle and from this point is obliquely directed upward. There are 5 low teeth at the proximal end of the upper margin, of which the first two are placed on the carapace, the third above the orbital margin and two in front of it; these teeth gradually increase in length from the posterior to the anterior. Of the 3 teeth of the lower margin the 1st stands immediately in front of the middle and just in front of the anterior tooth of the upper margin.

contiguous to the 1st tooth is the 2nd that is slightly larger, the 3rd tooth, finally, which is very small and the smallest of all, is placed midway between the 2nd and the apex.

The black ocellus is united at the inner side with the cornea, about as in *Acanth. angusta* (C. Spence Bate, l. c. Pl. CXXIV, fig. 6*a*) and there is a low rounded ocular papilla on the inner side of the stalk close to the cornea.

Telson almost as long as the outer uropods, with 5 movable minute spinules at either side along the posterior half.

The rostrum of the two males from Stat. 178 that are 120 to 125 mm. long, reaches as far forward as the antennal scales and resembles that of the described specimen, but the distal half ascends less strongly, so that the apex is situated in a line with the highest parts of the carapace. In one male of the 6 teeth on the upper border the 3rd is situated above the orbital margin, the three first teeth are equal and the following gradually increase in length; the 1st tooth of the lower margin is situated immediately behind the middle, just in front of the anterior tooth of the upper border, the 2nd is contiguous to it, while the apex of the 3rd tooth is $2^1/_2$-times as far distant from the extremity of the rostrum as from the apex of the 2nd tooth. In the other male the two first teeth are the shortest of the six, the 3rd is placed above the orbital margin, while the 5th is the longest of all; of the 3 teeth of the lower margin the first two are contiguous, situated immediately in front of the 6th tooth of the upper border, the 2nd is larger than the 1st, the very small third tooth, finally, is placed more forward than in the other male, though still a little farther distant from the extremity of the rostrum than from the 2nd tooth.

Telson, inclusive of the spines at the tip, as long as the outer uropod, 4 minute spinules at either side along the two posterior fifths.

In the two young specimens from Stat. 173 the rostrum extends considerably beyond the antennal scales and fully agrees with figure 7 on Plate CXXVI of the Report on the Challenger Macrura. In the larger one, in which the rostrum is 22,5 mm. long, the carapace 23,5 mm. and the abdomen 65 mm., so that this specimen measures 111 mm., the rostrum appears almost just as long as the carapace and is armed above with 6, below with 3 teeth; the 3rd tooth of the upper border is placed over the orbital margin, the two following gradually increase in length, so that the 5th just reaches beyond the distal end of the 1st antennular article, the 6th tooth, finally, stands more forward, nearly opposite to the middle of the antennal scale; the 1st tooth of the lower border, placed a little farther distant from the apex of the rostrum than from the orbital margin, stands immediately behind the 6th tooth of the upper border and the somewhat larger 2nd tooth is contiguous to it and placed immediately before the 6th tooth, the much smaller 3rd tooth, finally, as small as the 6th of the upper, stands about midway between the 2nd tooth and the apex of the rostrum. The other specimen is 89 mm. long, the rostrum 18,75 mm., the carapace 18,25 mm. and the abdomen 52 mm.; the rostrum, slightly longer than the carapace, is $\frac{8}{9}$-dentate; the 5 proximal teeth gradually increase in length, the 3rd stands above the orbital margin, while the 5th just projects beyond the distal end of 1st antennular article; the teeth of the lower margin are situated on the middle third part and become slightly smaller from the 1st to the 3rd, while the apex of the 3rd tooth is once and a half as far distant from that of the 2nd as the 2nd from the 1st.

The specimen from Stat. 45 measures only 77 mm., rostrum 14 mm., carapace $15^1/_2$ mm., abdomen $47^1/_2$ mm., the rostrum which just reaches beyond the antennal scales and which is still a little shorter than the carapace, is armed above with 7, below with 3 teeth; the 3rd tooth of the upper border stands above the orbital margin, the 6th reaches just beyond 1st antennular article, while the 7th stands immediately before the 1st of the lower margin; the three teeth of the latter are placed on the middle third and the apex of the 2nd, which is slightly larger than the 1st or the 3rd, is but little farther distant from that of the 3rd as from the 1st.

The rostrum of the specimen from Stat. 175 is broken off in the middle, but there are 6 teeth on the upper border, that gradually increase in length and of which the 3rd is placed above the orbital margin. The three young specimens from Stat. 178 are the youngest of all. In the first, long 50 mm., the rostrum ($6^1/_2$ mm.) reaches to the last third of the antennal scale and is distinctly shorter than the carapace; the 6 teeth of the upper border reach to the distal end of 1st antennular article, the 3rd is situated above the orbital margin and the three following are of equal size; the 3 teeth of the lower margin are placed on the middle third. In the youngest individual, in which the abdomen is wanting, the rostrum ($4^1/_2$ mm.) is about half as long as the carapace ($8^1/_2$ mm.) and reaches to the middle of the antennal scale; it extends straight forward, though slightly turned upward and is $\frac{3}{3}$-dentate; the teeth of the upper border are nearly equal, the foremost tooth is placed above the distal end of 1st antennular article, immediately behind the 1st of the three teeth of the lower margin, of which the 3rd is but little farther distant from the 2nd as the 2nd from the 1st and a little farther distant from the apex of the rostrum than from the 1st tooth. Of the third specimen, which is the largest of the three, the rostrum is broken.

General distribution: Arabian Sea (Alcock); Bay of Bengal (Alcock); Andaman Sea (Alcock); Siberut Island (Balss); South of the Philippine Islands (Spence Bate); Japan (Spence Bate, Balss); Banda Island (Spence Bate); Kermadec Islands (Spence Bate); North of the Falkland Islands (Spence Bate).

2. *Acanthephyra purpurea* A. M.-Edw. Pl. VI, Fig. 12—12*c*.

Acanthephyra purpurea A. Milne-Edwards, Compt. Rend. Acad. Sciences Paris, T. XCIII, 1881, p. 935.
Acanthephyra purpurea Stanley W. Kemp, "Fisheries, Ireland, Sci. Invest.", 1905, I. [1906], p. 4, Plates I and II, Fig. 1—3 (Synonymy).
Acanthephyra purpurea H. J. Hansen, The Danish Ingolf-Expedition, Vol. III. 2. Crustacea Malacostraca. I. Copenhagen, 1908, p. 75.
Acanthephyra purpurea Stanley W. Kemp, "Fisheries, Ireland, Sci. Invest.", 1908, I. [1910], p. 56—58 and in: Transact. Linnean Soc. London. 2nd Ser., Zoology, Vol. XVI, Pt. 1, 1913, p. 64.
Acanthephyra purpurea K. Stephensen, Vidensk. Meddel. fra den Naturh. Foren. Vol. 64, 1912, p. 64 and 329.
Acanthephyra purpurea O. Pesta, Zoologischer Anzeiger, Vol. XLII, 1913, p. 70.
Acanthephyra purpurea H. Lenz and K. Strunck, Deutsche Südpolar-Expedition 1901—1903, Vol. XV. Zoologie VII, Berlin 1914, p. 326.
Acanthephyra parva H. Coutière, Bull. Musée Océanogr. de Monaco, 1905, p. 15, Fig. 5.
Acanthephyra purpureus Th. R. R. Stebbing, South African Crustacea, Part VIII, London, 1915 (Annals South African Museum, XV, Part II, 1915), p. 96.

Stat. 141. Aug. 5. 1°0′.4 S., 127°25′.3 E. From 1500 m. depth to surface. Bottom very fine, hard sand. 1 young specimen.

Stat. 203. Sept. 19. 3°32′.5 S., 124°15′.5 E. HENSEN vertical net from 1500 m. depth to surface. 4 specimens, *parva* stage.

Stat. 208. Sept. 22. 5°39′ S., 122°12′ E. South of Muna Island. 1886 m. Bottom solid green mud. 1 male.

Stat. 230. Nov. 14. 3°58′ S., 128°20′ E. South-east of Ambon. From a depth of 2000 m. to surface. 3 young specimens, 2 of which belong to the *parva* stage.

Stat. 243. Dec. 2. 4°30′.2 S., 129°25′ E. From a depth of 1000 m. to surface. 1 specimen, *parva* stage.

The specimen from Stat. 141 is nearly 32 mm. long. The rostrum, 6 mm. long, is straight, slightly longer than the carapace (5 mm.) and faintly turned upward; it is $\frac{8}{6}$-dentate, the three posterior teeth of the upper border are placed behind the posterior tooth of the lower, the two posterior and the two distal teeth of the upper border stand a little closer together than the other teeth, which are placed at equal distances from one another and the anterior tooth of the upper border is one and a half as far distant from the tip as from the penultimate; except the two posterior the teeth of the lower margin are paired with those of the upper. The rostrum projects by the distal 6th part beyond the antennal scales.

The 3rd abdominal somite has the same form as in Fig. 5, 1 of COUTIÈRE's quoted paper, the carinate upper border being much more strongly curved than in the adult specimen from Stat. 208; the spines at the posterior extremity of the dorsal margin of the three following tergites are smaller than that of the 3rd and the equal spines of the 5th and 6th tergite are a little larger than that of the 4th. The 6th somite, 4,5 mm. long, is almost twice as long as the 5th (2,36 mm.) and twice as long as wide anteriorly. Telson 4,4 mm. long, almost as long as the 6th somite and projecting by half the length of the long terminal spines beyond the exopodite of the uropods; the lateral margins are armed on the left side with 5, on the right with 4 spines, the anterior or 1st pair of lateral spines are a little farther distant from the 2nd as the following from one another.

The four specimens from Stat. 203 belong to the *parva* stage and are 13—17 mm. long. In the largest specimen the rostrum projects straight forwards to the far end of 1st antennular article and is $\frac{8}{3}$-dentate (Fig. 12*a*); the 8 teeth of the upper border are placed on the rostrum proper, the 1st or posterior just in front of the orbital margin, the teeth diminish regularly in size to the 8th, which is about twice as far distant from the 1st as from the extremity of the rostrum; the 3 teeth of the lower margin are much smaller and placed opposite the 3 anterior teeth of the upper. In the second specimen the rostrum is as long as the eyestalks and the unarmed apex is slightly turned upwards; it is $\frac{6}{3}$-dentate, the teeth are placed like in the preceding specimen and their form and size are also the same. The rostrum of the third agrees in length and characters with that of the 1st, but it is $\frac{7}{3}$-dentate and the three teeth of the lower margin alternate with the 4 distal teeth of the upper; in the fourth specimen the rostrum is mutilated.

In the three specimens in which the rostrum is preserved, the 3rd abdominal somite shows the characteristic shape of the type of *Acanth. parva paucidens* Cout. (H. COUTIÈRE, l. c. Fig. 5, 3), so that one at first sight is inclined to regard these specimens as belonging to a

different species; in the fourth specimen the 3rd tergite is mutilated, like the rostrum. The measurements in millimeters of the 5th and 6th somites and of the telson are in the three well preserved specimens the following:

Rostrum	$\frac{8}{3}$	$\frac{7}{3}$	$\frac{5}{3}$
Length of 5th tergum . . .	1,3	1,2	1
Length of 6th tergum . . .	3,2	3,35	2,95
Width of 6th tergum. . . .	0,96	0,95	0,84
Length of telson	2,55	2,55	2,2

In the first specimen the 6th somite is 2,46-times as long as the 5th and 3,33-times as long as wide anteriorly; in the second these numbers are 2,8 and 3,5, in the third specimen 2,95 and 3,5. In these specimens the telson is a trifle shorter than the exopodite of the uropods, reaching only by the large spines of the tip to its extremity, and in all the lateral margins are armed with 4 pairs of spines besides those at the tip. These specimens therefore belong to the *parva paucidens* stage, though the number of rostral teeth rises to eight.

The male from Stat. 208, measuring 92 mm. from tip of rostrum to tip of telson, is almost full-grown. The rostrum (Fig. 12), 17,5 mm. long, when measured in a straight line from the base of the eyestalk to the apex, proves to be a little longer than the carapace (16 mm.) and is obliquely turned upward, nearly as in the figure of this species in the "Recueil de Figures de Crustacés nouveaux ou peu connus", but the upper margin is slightly concave and the upper border of the carapace slightly convex, whereas in the quoted figure the upper border of the carapace is slightly concave. The rostrum that projects by one-sixth of its length beyond the antennal scales, is $\frac{8}{6}$-dentate and on both margins the teeth reach to near the tip. The three posterior teeth of the upper margin, of which the 1st stands just in front of the orbital margin, are placed behind the 1st tooth of the lower and the lower margin is not straight, but slightly convex. The first tooth of the upper margin is the smallest of all, the 2nd and the 3rd slightly increase in size, while the following are almost as large as the 3rd and paired with the teeth of the lower margin.

The spine on the 3rd abdominal somite is the largest of all, while those of the three following somites are nearly equal, the spine on the 4th being but little smaller than that of the 5th; the fine notch on the keel of the 4th somite is situated on the posterior sixth. The 6th somite, 10,5 mm. long, is $1^1/_2$-times as long as the 5th, that measures 6,75 mm.; the telson, 13,5 mm. long, twice as long as the 5th somite and one-third longer than the 6th, is just as long as the outer uropod; besides a cluster of 6 or 7 irregularly placed spines at the end, there are only two pairs of lateral spines, the anterior of which is placed just behind the middle of the telson, the posterior a little nearer to the anterior pair than to the extremity. The legs of the 3rd pair are as long as the external maxillipeds, those of the 4th and the 5th decrease successively in length.

The largest of the three specimens from Stat. 230 is 34 or 35 mm. long and resembles the specimen from Stat. 141. Carapace and rostrum, of which the former is $5^1/_4$ mm. long, the latter $6^1/_4$ mm., agree with those of the adult male from Stat. 208, the rostrum being longer than the carapace, likewise obliquely turned upwards and reaching just as far beyond

the antennal scales; it is $\frac{8}{6}$-dentate, but here also the 3 posterior teeth are placed behind the 1st tooth of the lower margin. Different from the adult male the teeth on the lower margin are not paired with those of the upper, but they alternate with them.

The 3rd abdominal somite (Fig. 12*c*) has a different form, because the dorsal carina is much more strongly curved; the spine on this somite is the largest of the four and that of the 4th is distinctly smaller than those of the 5th and 6th which are of equal size. Sixth somite (4,75 mm.) almost twice as long as 5th (2,5 mm.), telson just as long as 6th somite and slightly shorter than the outer uropod; 4 or 5 pairs of lateral spines besides those at the tip.

The two younger specimens from this Station are 20 mm. long and belong to the *parva* stage. In one of them the rostrum extends just beyond the far end of 2nd antennular article and has the same form as in the specimen from Stat. 203. It is $\frac{8}{5}$-dentate; the 8 teeth of the upper margin that all stand on the rostrum itself, regularly decrease in size from the 1st which is placed just in front of the orbital margin, to the last and the distal tooth is just half as far distant from the tip as from the first; the 5 much smaller teeth on the lower margin are paired with the 5 distal teeth of the upper. The rostrum of the other specimen shows the same characters and is also $\frac{8}{5}$-dentate, but the 1st tooth stands above the orbital margin and the 8th is 3-times as far distant from the 1st as from the tip. Second abdominal tergum slightly carinate, 3rd presenting the same form as in the specimens from Stat. 203. The measurements in millimeters of the 5th and 6th somite and telson are the following:

	1	2
Length of the 5th somite	1,5	1,84
Length of the 6th somite	3,58	3,66
Width of the 6th somite anteriorly . .	1,28	1,3
Length of telson	3	3,3

In the first specimen the 6th somite is 2,4-times as long as the 5th and 2,8-times as long as wide, in the other these numbers are 2 and 2,8: the telson is armed on each side with 4 spinules in both specimens, besides those at the tip. The 6th somite has a somewhat stouter form than in the specimens from Stat. 203 and the second forms a transition to the *parva multidens* stage, the 6th somite being only twice as long as the 5th.

The specimen from Stat. 243, finally, measures 22 or 23 mm. and belongs also to the *parva paucidens* stage. The rostrum, which is as long as the antennular peduncle, is $\frac{4}{4}$-dentate; the 1st tooth of the upper border stands just in front of the orbital margin and its distance from the 7th is somewhat more than twice as long as the distance between the 7th and the tip; the 4 much smaller teeth of the lower border are situated on the middle of the rostrum and alternate with the 4 distal teeth of the upper.

Second abdominal somite carinate, the 3rd presenting the same form as in the specimens from Stat. 203. Fifth somite 1,7 mm. long, 6th 3,95 mm. long, 2,32-times as long as 5th, and 2,86-times as long as wide anteriorly, being here 1,38 mm. broad. The lateral margins of the telson which is 3,6 mm. long and which by the terminal spines of the tip reaches as far backward as the outer uropod, are armed with 4 spinules before the tip.

General distribution: *Acanthephyra purpurea* seems to have an almost cosmo-

politan distribution. It has been captured most often in the north Atlantic, both on the east and west side, as far northward as Davis Strait and Iceland, the variety *acanthitelsonis*, with which COUTIÈRE's variety *multispina* is identical, has been observed, both by the Challenger and the German Southpolar-Expedition, in the tropical Atlantic, while the typical species was taken by the same expeditions at various localities of the south Atlantic. This species has also been observed in the Mediterranean, recently also in the Adriatic and has been recorded from Cape Point Lighthouse, South Africa, under the name of *Acanth. batei*. It was taken by the Percy Sladen Trust Expedition N. of Chagos Archipelago and S. by E. of Farquhar, but it does probably not occur in the more northern parts of the Indian Ocean, being here replaced by the closely allied *Acanth. sanguinea* W.-Mas.; specimens of this species, finally, have been captured by the "Challenger" off Banda Island in the Indian Archipelago and off the coasts of Australia, New Zealand, the Kermadec Islands and Japan, while two specimens were taken by the "Albatross" in the Gulf of Panama: a world-wide distribution indeed.

3. *Acanthephyra armata* A. M.-Edw. Pl. VI, Fig. 13, 13*a*.

Acanthephyra armata A. Milne-Edwards, in: Annales Sciences Nat., Zool., (6) XI, 1881, Art. N° 4, p. 12, and in: Recueil de Figures de Crustacés nouveaux ou peu connus, 1883, Pl. 28, fig. 1.
Acanthephyra armata C. Spence Bate, Challenger Crust. Macrura, 1888, p. 744, Pl. CXXV, fig. 2.
Acanthephyra armata W. Faxon, in: Bull. Mus. Comp. Zool. Vol. XXX, 1896, p. 162.

Stat. 87. June 19. 0° 32′ S., 119° 39′.8 E. Strait of Makassar. 655 m. Bottom fine, grey mud. 1 ova-bearing female.
Stat. 161. Aug. 17. 1° 10′.5 S., 130° 9′ E. West of Salawatti. 798 m. Bottom muddy sand. 1 male.
Stat. 173. Aug. 28. 3° 27′.0 S., 131° 0′.5 E. East of Ceram. 567 m. Bottom fine, yellow grey mud. 2 males of medium size.
Stat. 262. Dec. 18. 5° 53′.8 S., 132° 48′.8 E. Kei-islands. 560 m. Bottom solid bluish grey mud, upper layer more liquid and brown mud. 2 ova-bearing females.
Stat. 314. Febr. 17, 1900. 7° 36′ S., 117° 30′.8 E. Bali Sea. 694 m. Bottom fine, sandy mud. 3 males of medium size.

No less than nine fine and well-preserved specimens of this apparently rare species were collected, both in the western and the eastern part of the Archipelago, among which are three adult ova-bearing females: they belong all to the typical species, described by A. MILNE-EDWARDS, not to the variety *fimbriata* W.-Mas., that occurs in the Arabian Sea and the Bay of Bengal. The male from Stat. 161 is 165 mm. long, the carapace, measured between the orbital and posterior margins, 38 mm., the rostrum, measured in a straight line from the orbital margin to the apex, 33 mm., the abdomen 94 mm.; the ova-bearing females are 170—178 mm. long, the carapace of the largest female, one from Stat. 262, measuring 38 mm., the rostrum 34,5 mm., the abdomen 105 mm. In these four adult specimens the rostrum is distinctly shorter than the carapace, in the larger male, long 147 mm., from Stat. 173 also still a little shorter, in the other male, long 135 mm., from the same Station the rostrum appears as long as the carapace and in the three males from Stat. 314, that are about of the same size as those from Stat. 173, it appears in one just as long as the carapace, in the two other ones, however, distinctly longer than it. In the adult male from Stat. 161 the teeth at the extreme proximal

end of the rostrum are only four in number, in the other specimens five, like in the type species from the West-Indies, excepting one ova-bearing female from Stat. 262 and one male from Stat. 314, in which six teeth are observed; these teeth are rather small and as a general rule they gradually and regularly increase in size from the first to the last, sometimes, however, like in an adult female from Stat. 262, two or three in the middle are equal and in the adult male the 4th tooth is even a little longer than the three preceding that gradually increase in size, taken together, but here the 5th or the 5th and the 6th are apparently not developed. The shape of the rostrum, the form and the size of the spine on the lower margin and its position with regard to the distal extremity of the antennal scale are typical, as figured in the "Recueil", excepting only that part of the rostrum which is situated in front of that spine. In Fig. 1 of the "Recueil" the lower border between the spine and the apex of the rostrum appears namely slightly convex, in all our specimens, however, quite straight, except the male, long 135 mm., from Stat. 314, in which the rostrum is distinctly longer than the carapace: in this specimen in front of the spine the lower margin appears very slightly concave, the upper margin slightly convex, almost as much as in BATE's figure 2, Plate CXXV of the Report on the Challenger Macrura, the rostrum appears, however, somewhat longer than in that figure and the spine on the lower margin much smaller. BATE's figure of *Acanth. armata* is, however, probably inaccurate, also as regards the spines of the abdominal terga, for the dactyli of the 5th pair of legs are figured just as long as those of the 3rd and 4th pair.

The rostral carina passes about on the middle of the gastric region gradually into a low rounded ridge that may be continued to near the posterior margin of the carapace. At about one-third the length of the carapace from its posterior border one observes, on either side of the median ridge, a fine, shallow furrow, a trace of the cervical groove; this groove reaches downward only to midway between the dorsal ridge and the longitudinal ridge that delimits the branchial region above; in the adult female from Stat. 87 it extends upwards to the dorsal ridge, curving slightly backward, but usually it does not reach the median ridge. In the old female from Stat. 87 the dorsal surface between the cervical groove and the posterior margin appears somewhat transversely rugose, presenting several irregular transverse furrows or grooves, traces of which occur also in other specimens, while in the rest the dorsal surface appears quite smooth. Orbital angle blunt, post-antennular spine small, post-antennal spine twice as large, not buttressed by a long sharp carina reaching backward to the end of the hepatic groove, as occurs in WOOD-MASON's variety *fimbriata*.

The spine of the 3rd tergum is the largest of the four, that of the 4th is somewhat shorter, measuring three-fifths that of the 3rd, the spine of the 5th is the smallest of all, only one-third that of the 5th, while the spine of the 6th tergum appears as long as that of the 4th: they are very well figured in the "Recueil". These spines, however, are described and figured by SPENCE BATE as subequal and in his figure those of the 4th, 5th and 6th somite appear larger than in our specimens: they are, no doubt, figured inaccurately, for the author has had the opportunity of examining the type specimen(s) of MILNE-EDWARDS himself. Sixth somite one-third longer than fifth. Telson (Fig. 13, 13*a*) one and a half as long as the 6th somite, terminating in an acute spine; on either side of the latter three other spines are observed, of which the

middle is the longest and as long as the median spine; these three pairs of spines are movable or perhaps the anterior one not. Along the posterior half of the telson 3 or 4 minute movable spinules are inserted on each side laterally. In the adult male from Stat. 161 and in the adult female from Stat. 87 the exopodite of the caudal swimmeret does not yet reach the acute extremity of the telson, being 1 or 1,5 mm. shorter, but in the other specimens telson and outer uropod are equally long.

Though the tergum of the 1st abdominal somite is not carinate in this species, I may, however, remark that in adult specimens, like in that from Stat. 87, a feeble trace of a median carina is sometimes observed on the posterior half of the tergum, that does not reach the posterior margin.

The pleuron of the 1st somite bears a fine furrow that runs, almost in the middle, parallel with the anterior margin to near the lower; on the pleuron of the 2nd somite two similar furrows occur, of which the posterior runs parallel with the posterior margin, while the anterior is more or less angular, both with the concavity turned forward; on the pleura of the three following somites a fine furrow, defined by a ridge, runs, near the anterior margin, from the lower border obliquely upward and forward to the anterior, the 6th somite, finally, is smooth. These furrows are pretty well visible in Fig. 1 of Plate III of the "Illustrations of the Zoology of the Investigator", in which a male of the variety *fimbriata* is figured.

The eye is dark purple and a little wider than the rest of the stalk; the black ocellus is situated on the upper side of the latter, one and a half times as far distant from the inner than from the outer margin and only partially free from the cornea, about as in *Acanth. Batei* Faxon (Challenger Crust. Macrura, Pl. CXXVI, Fig. 6*a*). There is a low obtuse tubercle on the inner side of the eyestalk contiguous to the cornea, while the outer margin of the eyestalk is slightly concave.

The external maxillipeds that extend almost as far forward as the lower spine of the rostrum, project in the male almost by the whole terminal joint, in the female by three-fourths of it beyond the antennal peduncle.

The 1st pair of legs reach in the adult male by half the length of the chelae, in the adult female only by the fingers beyond the antennal peduncle; the fingers are nearly half as long as the palm. The carpus of these legs is distinctly notched supero-internally near the distal extremity, so that a small, acute tooth, which is turned inward, is formed on the distal border; in the quoted figure of the "Illustrations" notch and tooth are distinctly visible, but in BATE's figure 2 of this species they are not indicated at all. The legs of the 2nd pair, of which the chelae are somewhat slenderer but the fingers also half as long as the palm, are but little longer, projecting only by the fingers beyond the legs of the 1st pair. The legs of the 3rd pair are the longest of all and reach by the dactyli beyond the external maxillipeds, those of the 4th are nearly as long as the 2nd, while the legs of the last pair are hardly shorter than those of the 1st. The meri of the three posterior legs are armed with small movable spinules on their lower margin, 12 to 14 on those of the 3rd and 4th pair, 4 or 5 on those of the last pair.

The pleopods are of the ordinary form, in the male there are two stylets at the base of the endopod of the 2nd pair, in the female one; in two specimens of medium size, in which

the coxae of the 5th pair show the usual structure as in the male, there is, however, only one stylet on the endopod of the 2nd pair, and it is the longer and more slender appendix which in these specimens is wanting. A similar observation was made by COUTIÈRE in a young specimen of *Systellaspis debilis* (A. M.-Edw.) [H. COUTIÈRE, in: Bull. Mus. Océanogr. Monaco N° 70, 1906, p. 9].

Eggs ovoid, very numerous, very small, 0,8 mm. long.

The variety *fimbriata*, described by WOOD-MASON and ALCOCK in: Annals Mag. Nat. Hist., 6th Series, Vol. 9, May 1892, p. 359 and in: Journal Asiatic Soc. Bengal, Vol. LXIII, Part II, N° 3, 1894, p. 156, but which in ALCOCK's Catalogue of the Indian Deep-Sea Crustacea 1901 was erroneously referred to the typical species, differs from the latter at first sight by the post-antennal spine being continued backwards, to the end of the hepatic groove, as a sharp carina, by the form of the rostrum, the spine on the lower margin being much more nearly opposite to the middle than to the apex of the antennal scale, by the four spines of the abdominal terga being equal and by the great development of the fringes of the legs.

General distribution: Off St. Lucia, West Indies (A. MILNE-EDWARDS); off Frederikstaed, Santa Cruz and off Nevis, West Indies (FAXON); off Banda Island (BATE). The variety *fimbriata* has been found in the Arabian Sea, off the S. W. coast of India, in the Bay of Bengal and in the Andaman Sea.

4. *Acanthephyra media* Bate, var. *obliquirostris* de Man. Pl. VI, Fig. 14—14*c*.

Acanthephyra media Sp. Bate, var. *obliquirostris* J. G. de Man, in: Zoolog. Mededeelingen, uitgegeven vanwege 's Rijks Museum van Natuurlijke Historie te Leiden, Deel II, 1916, p. 150.

Acanthephyra media C. Spence Bate, Challenger Crustacea Macrura, 1888, p. 736, Pl. CXXIV, fig. 5.

Acanthephyra media Stanley W. Kemp, in: Fisheries, Ireland, Sci. Invest., 1905, I., [1906], p. 20.

Stat. 148. August 20. 0° 17'.6 S., 129° 14'.5 E. Halmaheira Sea. 1855 m. Bottom fine, grey and green mud. 1 male.

Acanthephyra media Bate has been established on two specimens taken off Tablas Island, one of the Philippine Islands, and has not been observed again since 1888. The specimen, captured by the Siboga expedition, differs by the smaller number of teeth on the upper border of the rostrum and by the rostrum being directed obliquely upward, so that it perhaps may be considered as a distinct variety.

The male from Stat. 148 is 95 mm. long, the rostrum, measured from the orbital margin to its apex, being 15,5 mm. long, the carapace 17,5 mm. and the abdomen 62 mm., just 4-times as long as the rostrum. The carapace does not seem to differ from the type species, though it can hardly be described as "dorsally flat and smooth to the frontal region": like in the type it is anteriorly compressed. The rostral carina, obtuse as far as the 1st tooth of the rostrum, whence it becomes sharp, commences rather indistinctly at the level of the cervical groove which is shallow and fine and situated at the posterior third of the carapace; from the middle of the cephalothorax it runs at first slightly upwards, but, at the level of the

tooth of the lower border, it ascends more strongly obliquely upward, reaching almost to the extremity of the antennal scales, while in the type species the rostrum extends distinctly beyond them. At the base of the rostrum are six subequal, contiguous teeth on the sharp frontal crest, of which the 4th is situated above the orbital margin, while the 6th proves to stand above the corneae of the eyestalks, when stretched forward; in front of these teeth still four other similar teeth occur at larger, though equal distances from one another, of which the 1st reaches just beyond the spine of the lower margin, while the anterior tooth is twice as far distant from the acute tip of the rostrum as from the apex of the penultimate tooth. The large single tooth or spine of the lower border is straight and acute, implanted at the posterior fifth of the margin, directed obliquely downward and forward and reaches just beyond 1st antennular article.

Outer orbital angle hardly defined, post-antennular spine small, post-antennal spine very salient, and, like in the type species, continued backwards, to the end of the hepatic groove, as a sharp carina.

The abdomen resembles that of the typical species. Tergum of 1st somite rounded, with no trace at all of carination, 2nd to 6th somite sharply carinated, the 3rd to the 6th posteriorly produced to a tooth; the tooth of the 3rd somite is the largest, that of the 4th is a little smaller, while those of the 5th and of the 6th are the smallest of all and subequal. Like in other species there is a fine notch at the posterior fourth of the 4th tergum. Sixth somite about $1^1/_2$-times as long as 5th. Telson one-third longer than 6th somite and projecting by the terminal spines beyond the outer uropods, when stretched straight backward; its upper surface is faintly grooved, except just behind the middle where it is flattened. One observes at the end of the telson 3 movable spinules at either side of the terminal spine, while the sides of the posterior half are armed with 6 or 7 small, movable spinules.

Looked at from above the corneae appear just as broad as the rest of the eyestalk, in a lateral view they appear much thicker than it; they are chestnut-coloured, somewhat darker on the outer side, but there is no trace of an ocellus. The rather depressed eyestalks bear a prominent and acute, ocular papilla at the distal end of the inner border and this papilla is contiguous to the cornea and directed forward; the outer border of the eyestalk appears somewhat concave just behind the cornea, while the posterior half is obtusely carinate.

Antennulae a little more than half as long as the body, their peduncle reaching to the middle of the antennal scales; stylocerite with acute tip, almost as long as 1st article.

External antennae almost twice as long as the body. Lower side of 2nd joint of antennal peduncle obtusely carinated longitudinally in the middle and produced to a fine, slender, acuminate spinule that is turned downward and a little outward; flagellum 165 mm. long, twice as long as the body without the rostrum; scaphocerite measuring four-fifths of the carapace, the rostrum excluded.

External maxillipeds reaching two-thirds of the way along the antennal scale. The legs of the 1st pair project by the fingers, those of the 2nd by the fingers and half the palm beyond the antennal peduncle; the legs of the 3rd pair, the longest of all, are but little shorter than

the antennal scales, those of the 4th are as long as the external maxillipeds, the 5th pair, finally, are nearly as long as the legs of the 2nd pair. All the peraeopods show the same form and characters as in other species of this genus, so e. g. the carpus of the legs of the 1st pair, which at the distal end of the upper inner surface appears emarginate, with an acute tooth at the distal margin, and of the legs of the 3rd and 4th pair the ischium and the merus are armed with long, movable spinules on their lower margin, like also on the merus of the 5th pair.

There are two stylets at the base of the endopod of the 2nd pleopods.

General distribution: The typical species has been taken off Tablas Island, one of the Philippine Islands.

5. *Acanthephyra curtirostris* W.-Mas. Pl. VI, Fig. 15—15*b*.

Acanthephyra curtirostris J. Wood-Mason, Annals Mag. Nat. Hist. Febr. 1891, p. 195 and May 1892, p. 364, 365, Fig. 5.
Acanthephyra curtirostris W. Faxon, Memoirs Mus. Comp. Zool. XVIII, 1895, p. 164, Pl. XLIII, Fig. 2—5.
Acanthephyra curtirostris A. Alcock, Descr. Catal. Indian Deep-Sea Crust., 1901, p. 81.
Acanthephyra curtirostris Stanley W. Kemp, "Fisheries, Ireland, Sci. Invest., 1905, I., [1906], p. 22, 24".
Acanthephyra acutifrons C. Spence Bate, Challenger Crustacea Macrura, 1888, p. 749 (partim, teste Stanley W. Kemp, l. c.).
Illustrations of the Zoology of the Investigator, Crustacea, Pl. III, Fig. 4.

Stat. 48. April 13. 8° 4′.7 S., 118° 44′.3 E. Flores Sea. 2000 m. Bottom fine, grey mud, partially green. 1 young specimen.
Stat. 141. August 5. 1° 0′.4 S., 127° 25′.3 E. 1950 m. Bottom very fine, hard sand. 1 very young specimen.
Stat. 185. Sept. 12. 3° 20′ S., 127° 22′.9 E. Manipa-strait. From 1536 m. to surface. 1 adult male and 2 young specimens.
Stat. 210a. Sept. 24. 5° 26′ S., 121° 18′ E. Entrance of Gulf of Boni. 1944 m. Bottom grey mud, upper layer more liquid and brown; pumice stone. 1 adult male.
Stat. 217. Octob. 31. 6° 40′.6 S., 123° 14′.7 E. 2477 m. Bottom solid grey and green mud, superficial layer more liquid and brown. 1 adult, ova-bearing female.

The rostrum of the young specimen from Stat. 141, which is 25 or 26 mm. long, reaches almost to the far end of 1st antennular article and is armed above with 7 teeth.

Of the adult male from Stat. 185 unfortunately the distal half of the rostrum is broken off just above the spine on the lower margin. Measured along the upper border the 6th somite proves to be 11,5 mm. long, the 5th 7,3 mm. and the telson 16 mm.; the telson, distinctly longer than the outer uropod, is armed on each side with 9 or 10 spinules along the two posterior thirds. The two young specimens are 30 mm. long. In both the upper margin of the rostrum bears 7 teeth; in one the rostrum reaches almost to the 3rd antennular article and a line uniting the apices of the rostral teeth curves regularly downward, while the unarmed extremity projects horizontally forward; the rostrum of the other reaches only the distal end of the eyestalks, but its form is the same. In both individuals, like also in the young specimens from the Stations 48 and 141, the slender tooth on the lower margin is placed higher, nearer to the tip, than in the adult specimens.

The rostrum of the male from Stat. 210[a], which has the same size as the preceding, is just as long as the antennular peduncle, $\frac{3}{1}$-dentate and extends horizontally forward: it fully resembles the quoted figure in the "Illustrations", but a line uniting the apices of the 5 proximal teeth ascends very slightly upward, of the 4 following it descends slightly downward. Fifth abdominal somite 7,5 mm. long, 6th 10,5 mm., telson 15 mm., the telson like in the male from Stat. 185.

The ova-bearing female from Stat. 217 is about 86 mm. long, from tip of rostrum to end of telson. The rostrum is a little longer than the antennular peduncle, reaching to the middle of the antennal scales; the upper border, which is straight and armed with 10 teeth, rises somewhat, obliquely, upward, though the apex runs again horizontally forward; the unarmed distal extremity measures almost one-third the length of the toothed part of the upper border. The lower margin runs like a S, appearing concave above the single tooth, which is directed horizontally forward. Fifth abdominal somite 7,75 mm. long, 6th 11,75 mm., telson 15,5 mm.; the latter like in the two preceding specimens. Ova very numerous, small, 0,7—0,8 mm. long. The young specimen from Stat. 48 is 36,5 mm. long, the carapace, rostrum included, measuring 8,5 mm. The rostrum, $\frac{8}{1}$-dentate, reaches to just beyond 1st antennular article; a line uniting the apices of the 3 first teeth, ascends slightly upward, but from here the lower margin descends slightly downward, while the unarmed tip runs horizontally forward. The tooth on the lower margin, that reaches almost as far as the foremost tooth of the upper, extends horizontally forward. Fifth abdominal somite 2,75 mm. long, 6th 5,5 mm., so that the latter appears in this young specimen just twice as long as the 5th, while in adult specimens it is only about half again as long; the telson, 6,25 mm. long, though longer than the endopodite of the uropods, is slightly shorter than the exopodite.

In *Acanth. curtirostris* the brown coloured cornea appears, when looked at from above, a little less broad than the eyestalk and there is no ocellus; the apex of the ocular papilla or spine at the inner border of the eyestalk appears in the egg-bearing female subacute, in the other specimens rather blunt; in the adult specimens the inner margin of the papilla forms a straight line with that of the eyestalk, the papilla being contiguous to the cornea or embracing it, but in the young individual from Stat. 48 the obtuse papilla is turned obliquely inward, so that its inner margin makes an angle with that of the peduncle; this is also the case in the young specimen from Stat. 141, long 25 or 26 mm., but in the two young specimens from Stat. 185 the papilla runs nearly as in the adult.

Like in other species of this genus the keel of the 4th tergum bears a fine notch, which in this species is situated in its posterior fifth. According to Alcock (l. c. 1901) the legs of the 3rd pair should be not longer than the 4th and 5th pairs; in all our specimens, however, the 3rd pair are the longest of all, while those of the 4th and 5th successively decrease in length. In the adult egg-bearing female the legs of the 3rd pair extend to the apex of the antennal scales, those of the 5th only to the middle of these appendages; in the male specimens the three posterior legs are a little shorter.

General distribution: Arabian Sea (Alcock); Bay of Bengal (Alcock); Andaman Sea (Alcock); from off San Diego, California, to the Gulf of Panama (Faxon, Rathbun).

6. *Acanthephyra* sp. Pl. VI, Fig. 16.

Stat. 230. Nov. 14. 3° 58′ S., 128° 20′ E. South-east of Ambon. From a depth of 2000 m. to surface. 2 specimens.
Stat 243. Dec. 2. 4° 30′.2 S., 129° 25′ E. From a depth of 1000 m. to surface. 1 specimen.

I not succeed in determining with certainty these specimens, that probably are the young stage of a known species. They belong to that section of the genus in which the rostrum is unarmed below, in which the dorsal tooth of the 3rd abdominal tergum does not reach to the middle of the 4th and in which the rostrum is deep at base, so that they bear a close resemblance to *Acanth. tenuipes* (Bate), one specimen of which was trawled by the Challenger Expedition off the East coast of Cape York Peninsula.

The two specimens from Stat. 230 are of the same size, about 18 mm. long. In one of them the rostrum reaches the far end of 1st antennular article and is armed above with 7 teeth; these teeth are rather large, contiguous, the 3rd is placed above the orbital margin; a line uniting their apices appears slightly arched and a little more than twice as long as the distance between the foremost tooth and the tip. The rostrum of the other specimen has the same form and length, but there are only 5 teeth on the upper margin, one of which stands on the carapace. The rostral carina arises at the anterior third of the carapace. Antennal spine small, buttressed by a short carina, that does not reach the hepatic groove. First abdominal tergum smooth, 2nd to 6th carinate; carina of 3rd tergum somewhat more curved than in Bate's figure 2 of Plate CXXXVI, the posterior spine as long as in that figure. The dorsal carina of the 4th tergum bears a small incision just in front of the posterior spine, which is much smaller than that of the 3rd tergum, but as large as that of the 5th, while the posterior spine of the 6th is the smallest of all.

Measurements in millimeters:

	1	2
Rostrum	$\frac{7}{0}$	$\frac{5}{0}$
Length of 5th tergum	1,24	1,2
Length of 6th tergum	3,1	3,12
Width of 6th tergum anteriorly	1,08	0,96
Length of telson	3,12	3

Telson a little shorter than the outer uropod, but projecting by the large terminal spines beyond it; the lateral margins are armed in the first specimen with 8 or 9 spinules, besides those at the tip, in the other they could not be numbered with certainty.

The specimen from Stat. 243 measures 19 or 20 mm. The rostrum has the same form as in the two preceding, but bears 6 teeth, the 3rd of which stands above the orbital margin; the 6th or distal tooth is half as far distant from the tip of the rostrum as from the 1st. In this specimen the anterior half of the carapace is sharply carinate dorsally, while in the two preceding specimens the rostral carina arises at the anterior third; the carina of the antennal spine is also longer and reaches to the hepatic groove. The abdomen agrees with that of the specimens from Stat. 230. Second tergum carinate, like the following. Fifth tergum 1,2 mm. long, 6th 3,4 mm. long and 1,2 mm. wide anteriorly; telson 2,9 mm. long, com-

paratively shorter than in the preceding specimens, much shorter than the outer uropod, even a little shorter than the inner, but projecting beyond the latter by the large spines at the tip; lateral margins of the telson only with 3 spinules besides those at the tip.

According to Bate's description of *Acanth. tenuipes* (Report Challenger Macrura, 1888, p. 836) the rostrum should be armed "with four or five distantly placed minute denticles", but on the figure 2 of Plate CXXXVI nine denticles are visible. The 2nd abdominal tergum should, after the same author, be smooth, while in our specimens it is distinctly carinate. I therefore hesitate to refer them to Bate's species and I may, finally, allude to the fact that the two specimens from Stat. 230 show some slight differences from that which was collected at Stat. 243, as has been described in the preceding lines.

7. *Acanthephyra (Meningodora) Sibogae* de Man. Pl. VII, Fig. 17—17*j*.

Acanthephyra (Meningodora) Sibogae J. G. de Man, Zoologische Mededeelingen, uitgegeven vanwege 's Rijks Museum van Natuurlijke Historie te Leiden. Deel II, Afl. 3 en 4, 1916, p. 149.

Stat. 210a. September 24. 5° 26′ S., 121° 18′ E. Entrance of Gulf of Boni. 1944 m. Bottom grey mud, upper layer more liquid and brown; pumice stone. 2 specimens, probably female.

A new remarkable species related to *Acanth. brevirostris* Smith = *Hymenodora duplex* Bate, to *Acanth. rostrata* (Bate) and to *Acanth. Batei* Faxon = *Acanth. brevirostris* Bate. It agrees with the two first in the possession of a soft and membranaceous integument, owing to which both specimens are in a rather damaged condition, and of a short rostrum, while it resembles *Acanth. Batei* Faxon also by the shortness of the rostrum and by the abdomen, of which only the carinae of the 4th, 5th and 6th somite are produced posteriorly to a small tooth. The two specimens are nearly of equal size, about 59 respectively 64 mm. long from tip of rostrum to tip of telson: owing to the bad condition the length of the abdomen could not be measured accurately, the abdomen, however, appears to be twice or little more than twice as long as the carapace, rostrum included. Carapace dorsally carinate along its whole length, the carina extending from the apex of the rostrum to or almost to the posterior margin; the carina is sharp and shows, a little before the middle, a depression, that corresponds with the cervical groove. The rostrum, that bears much resemblance to that of *Hymenodora mollis*, as figured by Spence Bate (Challenger Macrura, Pl. CXXVI, Fig. 5), is in the smaller specimen, in which it is complete, about one-fifth the length of the rest of the carapace, when measured horizontally, as indicated by Stanley Kemp (in: "Fisheries, Ireland, Sci. Invest. 1905, I., [1906], p. 9, Fig. 1") and appears just as high, at the level of the orbital margin, as long. About midway between the cervical groove and the level of the orbital margin the dorsal carina of the carapace curves at first downward to near the corneae of the eyestalks, when stretched straight forwards, and runs then horizontally or slightly ascending forward to the tip. The upper edge, i. e. the described descending part of the rostral carina, is armed with 6 small, immovable teeth, of which the 4th is placed immediately in front of the orbital margin, so that three teeth are placed before and three behind that margin; the distance between the 3rd and the 4th tooth is a little larger than the distances between the other teeth, the distances

between the 1st and the 2nd and between the 4th and the 5th being the smallest of all. The teeth are of equal size, excepting the 5th that is a little smaller; a minute prominence occurs at the base just behind the 1st tooth, only visible, like the teeth themselves, by means of a magnifying glass. The horizontal terminal part of the upper margin is unarmed and reaches to the middle of the 2nd joint of the antennular peduncle. The lower margin of the rostrum that forms a sort of hood over the eyestalks, recedes, regularly arched, backward and downward and bears a very small denticle, somewhat nearer to the extremity of the rostrum than to the anterior tooth of the upper margin; this ventral tooth is still much smaller than the 5th tooth of the upper border. In the other somewhat larger specimen the tip of the rostrum is broken off, so that it hardly reaches as far as the 1st joint of the antennular peduncle and it remains uncertain whether the minute ventral tooth occurs also here; there are in this specimen only 4 teeth on the upper margin, of which two are placed somewhat behind the orbital sinus, the 3rd just over it and one and a half as far distant from the 2nd tooth as from the 4th; immediately behind the 1st tooth the same minute prominence as in the other specimen.

Outer canthus of the rather deep orbital sinus rectangular, the orbital margin making a right angle with the anterior border of the carapace, but a post-antennular spine, which is obvious in Bate's figures of *Acanth. Batei* Faxon (Challenger Macrura, Pl. CXXVI, Fig. 6, less distinctly also in Fig. 5), does not occur in *Acanth. Sibogae*. The anterior margin of the carapace runs, from the outer orbital angle, at first for a short distance straight downward but soon it runs more obliquely, behind the antennal peduncle, and this oblique part of the margin is slightly concave. Post-antennal spine well-developed, salient, a little remote from the margin and flanked by a carina that runs at first backward and then curves downward to the hepatic groove. Cervical groove quite conspicuous; it proceeds from the dorsal carina, which it does not seem to intersect, obliquely downward and forward to near the antennal carina and then curves forward, in a semicircular curve, to meet another groove that commences at the orbital margin and that runs obliquely backward and downward; this shallow orbital groove is flanked by a low keel that gradually passes into the posterior ridge of the cervical groove. Hepatic groove well defined, proceeding from the cervical groove, behind the semicircular curve, at first obliquely downward and forward to near the antennal carina and continuing then, buttressed by a keel, obliquely downward and backward to near the posterior extremity of the antennal carina. From the angle thus formed a strong prominent ridge or crest, the upper boundary of the branchial region, runs horizontally backward to near the posterior margin of the carapace, at the level of the antennal carina and somewhat farther distant from the dorsal carina of the carapace as from the lower border; from the posterior extremity of this ridge a narrow groove runs obliquely forward and downward, gradually diverging from the ridge, to near the hepatic groove.

The abdomen almost fully resembles that of *Acanth. Batei* Faxon (Challenger Macrura, Pl. CXXVI, Figs. 5, 6). The two first somites are rounded, the 3rd is carinate, but the feeble keel ends abruptly, there being no tooth at the posterior margin; the three following somites are sharply carinate and distinctly produced to a small tooth, the teeth are of equal size and the notch on the 4th somite is situated at the posterior third. Sixth somite $2^1/_2$-times as long

as the carinate part of the 5th and $2^1/_2$-times as long as broad; the pleura of the 4th and 5th somite are separated from the terga by an obtuse ridge or crest, that continues on the 6th, running on it nearly twice as far distant from the lower as from the upper margin, though gradually fading away on the middle. In the cited figures 5 and 6 of *Acanth. Batei* Faxon the telson appears hardly longer than the 6th somite and even shorter than the endopodite of the caudal fan: in *Acanth. Sibogae*, however, the telson is almost one and a half as long as the 6th somite, the telson being in the larger specimen 11 mm. long, the 6th somite 8 mm., while in the other specimen these numbers are 10,5 mm. and 7,5 mm. The telson that ends posteriorly in an acute spine, reaches, beyond the endopodite of the caudal fan, almost to the end of the exopodite and is grooved longitudinally from the terminal spine to near the base; the groove is rather deep and ridged anteriorly, the ridge proceeding from the anterior end of the groove almost to the middle. There are 3 or 4 pairs of very small spinules on the lateral borders of the telson, the anterior pair situated just in the middle; the terminal spine of the telson is flanked on each side by 3 spines, of which the middle one is the longest, twice as long as the median spine, and reaching to the end of the outer plates of the caudal fan.

Corneae reddish brown, small, but one-fourth as long as the rest of the eyestalk and somewhat less broad than the latter; they are hemispherical, but their posterior margin runs obliquely with regard to the longitudinal axis of the eyestalk. An ocellus seems to be wanting, but there is a blunt, though prominent ocular papilla on the inner side, just behind the cornea and directed inward.

Antennular peduncle reaching almost to the middle of the antennal scale, basal article almost as much longer than the eyestalks as the corneae are long, stylocerite acuminate, somewhat shorter than the eyestalks; flagella broken off; the upper outer one at base much broader than the lower.

Basal article of antennal peduncle with a small spinule on the lower margin; scaphocerite almost 3-times as long as broad, the outer border slightly convex, terminal spine shorter than the oblique distal end of the scale; flagellum wanting.

Mandibles (Fig. 17*d*) imperfectly cleft, the incisor process 3-times as broad as the molar process and armed with 8 or 9 brownish red teeth; the four first teeth, commencing from the outer side, gradually increase in length, the 4th being the longest of all the teeth with which this process is armed. Second joint of mandibular palp a little more than one and a half as long as 3rd joint. The two inner distal lobes of the second maxilla (Fig. 17*e*) are narrow and project considerably beyond the basal lobe, while of the two distal lobes the anterior is one-fourth broader than the other.

Endopod of 1st maxilliped composed of 3 segments; the 2nd segment, which is about 4-times as long as broad in the middle, is $2^1/_2$-times as long as the 3rd or last and about 4-times as long as the basal joint. The outer plate is a little longer than the endopod, its distal margin is regularly rounded and the inner margin is reflexed at nearly right angles longitudinally (Fig. 17*f*). The terminal joint of the 2nd maxilliped (Fig. 17*g*) is obliquely articulated with the penultimate or 6th joint and the length of the 4th, that is twice as long as its distal margin is wide, measures three-fifths the length of the two last joints taken together. The 5th joint, finally, which is as long as wide, is auriculate at the inner side, while the outer margin is half as long as

the 4th joint. In the larger specimen the external maxillipeds reach almost to the tip of the antennal scales, in the other to the distal fifth of their length; last joint twice as long as penultimate.

The 1st pair of peraeopods (Fig. 17 *h*) reach to somewhat beyond the middle of the antennal scales; merus about 4-times as long as wide, the margins parallel to a little beyond the middle, from where it narrows towards the distal end. Carpus a little more than half as long as the merus, 4,6-times as long as thick; chela one-third longer than carpus, fingers nearly one-fourth the length of the chela.

Second legs (Fig. 17 *i*) hardly longer than those of the 1st pair. Merus nearly as long as in the 1st pair, but $4^1/_2$-times as long as wide, presenting for the rest the same form. Carpus $^1/_{10}$ shorter than merus, slender, 9-times as long as thick in the middle; chela $^1/_7$ shorter than carpus, fingers almost one-third the length of the chela.

Merus of 3rd or 4th legs (Fig. 17 *j*) 7-times as long as wide, narrowing from the middle toward the distal end, with 7 spines near and along the lower margin, while there are also a few spines on the ischium. Carpus a little more than one-third the merus, 6-times as long as thick; propodus $2^1/_3$-times as long as the carpus, slender, 20-times as long as wide in the middle, dactylus one-third the length of the propodus.

Legs of the last pair reaching almost to the distal end of the antennal scales. Merus just as long as in the preceding pair, but 10-times as long as wide and with only 3 spines near the lower margin. Carpus $^3/_8$ the length of the merus, propodus nearly 3-times as long as the carpus, about 25-times as long as wide in the middle, dactylus very short, rudimentary, almost hidden by a plume of setae.

The pleopods of the 2nd somite are provided only with one stylet in both specimens, which are therefore probably females.

Family Nematocarcinidae.

This family is represented only by the genus *Nematocarcinus* A. M.-Edw., Dr. Calman having proved already in 1896 that the species of the genus *Stochasmus* Bate is a true *Nematocarcinus*. This remarkable genus was first discovered by the expedition of the "Blake" in the Caribbean Sea, where *Nemat. cursor*, described in 1881 by A. Milne-Edwards, proved to be common at a depth of 500 fathoms and a second, certainly different form, *Nemat. ensifer* (S. I. Smith) from off the East coast of the United States was made known in 1882. In the Report on the Challenger Macrura, however, no less than 15 new species of *Nematocarcinus* are described, chiefly characterized by the length of the rostrum and its denticulation, but the author himself considered these characters already as untrustworthy, for, when describing *Nemat. proximatus* at p. 808 of his work, a species differing from *Nemat. longirostris* only in the length of the rostrum and in the number of teeth upon it, especially on the lower margin, Spence Bate writes: "although for the sake of the convenience of classification I call them by different specific names, I cannot help feeling that they are mere variable forms of one deep-sea species". Some of these Challenger species now bear apparently such a close resemblance to

Nemat. cursor or *Nemat. ensiferus*, that one is inclined to regard them as identical or at most as varieties and this has indeed already been done by several authors. I may, however, be allowed to remark, that these questions of synonymy can only then be solved with absolute certainty, when specimens of these related indopacific species should be scrupulously compared with specimens from the Antilles or from the east coast of the United States. Our knowledge of the species of this genus leaves namely still very much to be desired: slight differences may after all exist, which hitherto have been overlooked, but which nevertheless may be of specific or varietal value. So e.g. when studying some specimens from the Kei-islands referred to *Nemat. gracilis*, I discovered a remarkable character of the dactyli of the 3rd and 4th pair of legs, by which this species may easily be distinguished from the closely allied *Nemat. undulatipes* Bate.

In the Caribbean Sea only one species has hitherto been observed, *Nemat. cursor* A. M.-Edw., but this species is here very common, for during the winter cruise of the "Albatross" in 1884 no less than 6810 specimens were taken in the eastern part of this sea (S. I. Smith, in: Report on the Decapod Crustacea of the Albatross Dredgings off the East coast of the United States during the summer and autumn of 1884. Wash. 1886, p. 61): this number would have been sufficient for supplying all the musea of the world with lots of specimens of this species! *Nemat. cursor* occurs also off the East coast of the United States as far as 38° N. Lat., and it is recorded from the Arabian Sea, the Gulf of Manár and the Bay of Bengal by Professor Alcock, who has perhaps been in the occasion of comparing his species with specimens from the West Indies. When this, however, has not been the case, I should be inclined to refer his indian specimens to *Nemat. undulatipes* Bate. *Nemat. ensifer* (S. I. Smith) is found off the eastern coast of the United States and also on the west coast of America from the Gulf of California to the Galapagos Islands and Ecuador: both on the eastern and on the western coast this species varies, however, considerably, so that on the western coast a more southern typical and a northern different form have been distinguished by Faxon in his valuable and beautiful work on the Stalk-eyed Crustacea, collected by the "Albatross". The typical *Nemat. ensiferus* has also been recorded from the Hawaiian Islands and Sagami-bay, Japan, but the species living in these localities will probably prove to belong to the variety *producta* Bate or *tenuipes* Bate. The indopacific representatives of *Nemat. ensiferus* belong namely probably to one or two distinct varieties *producta* Bate and *tenuipes* Bate, of which the former has been observed near Yokohama, Japan, in the Indian Archipelago and off the New Hebrides, while the variety *tenuipes* is known also from Japan, from the Admiralty Islands, from the Bay of Bengal and the Arabian Sea: these two varieties, however, are perhaps identical. The Eastern Atlantic is likewise inhabited by a variety *exilis* Bate of this so extremely variable form: this variety ranges from the South and South-west of Iceland, along the west coast of Ireland, to the Canary Islands and has even been observed off the island of Ascension, it occurs moreover both in the eastern and in the western Mediterranean. *Nemat. gracilipes* A. M.-Edw. of a splendid rose colour and with wonderfully attenuated feet, was taken by the "Talisman" in July 1883 in the deep waters of the Cape Verde Archipelago: no less than 500 specimens of this species were then captured.

While only three species are found in the Atlantic, a larger number occur in other

parts of the world. *Nemat. Agassizii* Faxon ranges from Acapulco on the west coast of Mexico to the Gulf of Panama and the Galapagos Islands. *Nemat. longirostris* Bate is still only known from near Yokohama, Japan, but *Nemat. proximatus*, which Spence Bate himself is inclined to regard as a variety of *longirostris*, has been obtained not only also off Yokohama, in the Arafura Sea and near Marion Island in the southern Indian Ocean, but even off the coast of Chili, an almost cosmopolitan distribution indeed! *Nemat. altus* Bate is still only known from south of the Philippine Islands and *Nemat. intermedius* Bate only from off the north coast of New Guinea. A third or fourth species, inhabiting the seas of Japan, is *Nemat. parvidentatus* Bate, which, according to the Rev. Stebbing, should live also off Cape Natal, South Africa. *Nemat. lanceopes* Bate is a form inhabiting the Antarctic Sea (South-east of Kerguelen Island and off Coats Land) and which should also occur off Cape Point, South Africa. *Nemat. gracilis* Bate ranges from the Hawaiian, Fiji and Kermadec Islands through the Indian Archipelago as far as the Arabian Sea. *Nemat. undulatipes* Bate is known from off the Philippine Islands, the Banda Sea, the Fiji Islands and the Kermadec Islands, while many specimens were collected by the "Siboga" at eight Stations throughout the whole Archipelago. *Nemat. tenuirostris* Bate shows the same distribution as *Nemat. gracilis*, from the Hawaiian and Fiji Islands to the Gulf of Manár: a nice variety *Sibogae* was discovered by this expedition south of the island of Rotti. Two species, finally, are found off the coast of New Zealand: *Nemat. serratus* Bate and *Nemat. hiatus* Bate.

As results from the preceding, the Indian Archipelago seems therefore to be inhabited by 6 species and one variety. Three species and that variety were collected by the "Siboga", the other ones are *Nemat. altus* Bate, a still little known form, *Nemat. proximatus* Bate from the Arafura Sea and, finally, *Nemat. tenuirostris* Bate.

All the species of this genus are found in deep water, though the depth varies considerably, as results from the List at the following pages. The greatest depth recorded is of *Nemat. altus*, which was taken in 2150 fathoms, *Nemat. ensifer* was found in 2033, the variety *exilis* in 1980, the variety *producta*, *Nemat. longirostris*, *parvidentatus* and *proximatus* in 1875 fathoms; *Nemat. ensifer* was, however, also observed at a depth of 588 fathoms, the other species also in much less deep water. On one occasion several specimens of *Nemat. proximatus* were dredged by the "Challenger" in the Arafura Sea in only 28 fathoms, but this has been, no doubt, a rare exception. Excepting *Nemat. gracilis* and *tenuirostris*, all the other species were taken in more than 200 fathoms.

LIST OF THE SPECIES OF THE GENUS NEMATOCARCINUS A. M.-Edw., KNOWN AT PRESENT, February 1917.

SPECIES	HABITAT	DEPTH IN FATHOMS
Agassizii Faxon 1893	West coast of Mexico (Acapulco)	660
	Gulf of Panama	134—1020
	Galapagos Islands	551—885
altus Bate 1888.	South of the Philippine Islands	2150

SPECIES	HABITAT	DEPTH IN FATHOMS
cursor A. M.-Edw. 1881	Antilles	500
	Eastern Caribbean Sea	683
	Off the East coast of the United States 37° 59′ 30″—39° 39′ 45″ N. lat. 71° 35′ 15″—73° 48′ 40″ W. long.	384—693
	Off Nevis, Antilles	356
	Off Guadeloupe	393, 583
	Off Martinique	334
	Off St. Vincent	573
	Off Barbados	209
ensifer (S. I. Smith) 1882	Off the East coast of the United States 31° 41′—41° 43′ N. lat. 65° 21′ 50″—74° 57′ 40″ W. long.	588—2033
	West coast of America from the Gulf of California to the Galapagos Islands and Ecuador.	660—1879
	Hawaiian Islands [1]	293—1314
	Sagami Bay, Japan [1]	328
ensifer (S. I. Smith) var. *exilis* (Bate) 1888.	South-west of Iceland	695
	South of Iceland	800—1128
	Off the south-west coast of Ireland	750
	Off the coast of County Kerry, Ireland	500—893
	Off the Canary Islands	
	Near the island of Ascension	1093
	Bay of Biscay	437—934
	Coast of Sardinia	874—1980
	Eastern Mediterranean	821—1380
ensifer (S. I. Smith) var. *producta* Bate 1888	Near Yokohama, Japan	1875
	Off Luzon, Philippine Islands	1050
	Off Banda Island	1425
	Between Ambon and the Lucipara-islands	1137
	Off the New Hebrides	1450
ensifer (S. I. Smith) var. *tenuipes* Bate 1888	South of Japan	345, 565
	Near the Admiralty Islands	1070
	Bay of Bengal	1310
	Arabian Sea	824—1200
[2] *gracilipes* A. M.-Edw. 1884.	Off the Cape Verde Islands	465
gracilis Bate 1888	Off the Hawaiian Islands	165—703
	Off Kandavu, Fiji Islands	610
	North of the Kermadec Islands	600
	Kei-islands	306
	South of the island of Rotti	502
	Arabian Sea	459—705
hiatus Bate 1888	Off New Zealand	700

1) The specimens taken off the Hawaiian Islands and in the Sagami Bay, Japan, should perhaps be referred to the variety *producta* Bate.

2) A good figure of this species is found in "Nature", Vol. XXIX, of April 3, 1884, p. 532 and in: H. Filhol, La vie au fond des mers. Paris 1885, p. 143, Fig. 45.

SPECIES	HABITAT	DEPTH IN FATHOMS
intermedius Bate 1888	Off the North coast of New Guinea	1070
lanceopes Bate 1888	Antarctic Sea: 60° 52′ S., 80° 20′ E. and	1260
	71° 22′ S., 16° 34′ W.	1410
	Cape Point, South Africa	460—900
longirostris Bate 1888	Near Yokohama, Japan	1875
parvidentatus Bate 1888	Near Yokohama, Japan	1875
	Cape Natal, South Africa	440
[1]) *proximatus* Bate 1888	Near Yokohama, Japan	1875
	Off the west coast of America	1450
	Arafura Sea	28
	Near Marion Island	1375
	West of Valparaiso	1375
serratus Bate 1888	Off New Zealand	700
tenuirostris Bate 1888	Hawaiian Islands	165—881
	Off Kandavu, Fiji Islands	610
	South of the Philippine Islands	500
	Bay of Bengal	561, 669
	Gulf of Manár	597
tenuirostris Bate var. *Sibogae* de Man 1917	South of the island of Rotti	502
[2]) *undulatipes* Bate 1888	North of the Kermadec Islands	600
	Off Kandavu, Fiji Islands	610
	Off Sibago, Philippine Islands	250
	South of the Philippine Islands	500
	Off Banda Island	200
	Kei-islands	306
	Between Ceram and New Guinea	310
	North of Menado	691—637
	Sulu Sea	694
	Strait of Makassar	711
	Flores Sea	434
	Bali Sea	294, 380
	Arabian Sea	609—620, 675
	Gulf of Manár	406
	Bay of Bengal	240, 270, 272

1. *Nematocarcinus ensifer* (S. I. Smith) var. *producta* Bate. Pl. VIII, Fig. 18, 18*a*.

Nematocarcinus productus C. Spence Bate, Report Challenger Macrura, 1888, p. 810, Pl. CXXXII, fig. 5.

Stat. 227. Nov. 13. 4° 50′.5 S., 127° 59′ E. 2081 m. Bottom grey mud with an upper layer of brown mud, both mixed with sand. One egg-bearing female.

Rostrum gradually tapering, little more than half as long as the rest of the carapace and slightly curved upward, as in BATE's figure 5. Upper border armed with 23 small teeth that are directed forward and 7 of which stand on the carapace; the 1st tooth is placed at the

1) SPENCE BATE himself is inclined to regard this species as a variety of *Nemat. longirostris* Bate.
2) *Nemat. paucidentatus* Bate must be considered as identical with this species.

anterior fourth of the gastric region; the 7 or 8 proximal teeth are closely set, the 3 or 4 following a little farther distant from one another, the 13th—15th are again more closely placed, while the rest are more and more remote anteriorly, so that the equal distances between the 20th and 21th like between the 21th and 22th are larger than those between the preceding teeth and the largest of all; the foremost tooth is placed close to the tip, 4-times as far distant from the penultimate as from the tip, while the distance between the antepenultimate and the penultimate tooth is one and a half as long as that between the penultimate and the last. Except the two distal ones, all the rostral teeth are movably articulated. While BATE's figure 5 pretty well agrees with our specimen, as regards the length, shape and direction of the rostrum, the rostral teeth appear in the female from Stat. 227 comparatively much smaller than in that figure, only half as long, for they measure only one-third the height of the rostrum, in BATE's figure, however, two-thirds. Posterior to the 1st tooth the rostral carina is continued as a rounded slight crest to near the after limit of the gastric region. Lower margin unarmed, but fringed with feathered setae along its whole length; lateral crest on the sides of the rostrum distinct. According to S. I. SMITH's description in: Annual Report of the Commissioner of fish and fisheries for 1882, Wash., 1884, p. 369, in the typical *Nemat. ensifer* from off the East coast of the United States, "the cervical suture should be indicated by a distinct sulcus from the dorsum to the upper part of the hepatic region either side"; in the female from Stat. 227, however, there is only a shallow depression between the gastric and the cardiac region on the dorsum of the carapace and from this depression no sulcus runs downward and forward, though at a short distance from the dorsum the cervical suture becomes distinct as a groove that runs downward and slightly forward, defining the gastric region posteriorly; at the lower third of the carapace it passes into a short longitudinal groove, that separates posteriorly the hepatic region from the gastric. A little back the orbital margin another furrow runs backward, parallel with the rostral carina and defining the gastric region below, but not reaching the dimple of the hepatic region. Cardiac region rounded dorsally, with a very small tubercle in the middle line about at the posterior fourth; this tubercle, that occurs also in the typical *Nemat. ensifer*, is so small (one fourth millimetre broad) that it is invisible in a lateral view of the carapace. Branchial region defined dorsally by an arched groove, that does not reach the posterior margin of the carapace nor the cervical suture. Outer orbital angle obtuse, distinct. Post-antennular spine reaching as far beyond the outer orbital angle as the latter does beyond the orbital margin; branchiostegal spine of the same size as the post-antennular and directed forward and slightly downward. Both spines show a much smaller size than in BATE's figure.

Abdomen not yet twice as long as rostrum and carapace combined, but 5-times as long as the rostrum. Like in the variety *tenuipes*, according to ALCOCK's description (1901), here also the posterior border of the 3rd abdominal tergum is strongly and subacutely produced in the middle line. Sixth somite twice as long as 5th and just as long as the telson, exclusive the terminal spines; telson rounded above, not sulcate, bearing, inclusive those near the tip, 8 pairs of dorso-lateral spinules, that reach to the anterior third, while the tip is armed with 2 pairs of spines. Outer uropod as long as the telson, inclusive the terminal spines, inner uropod a little shorter.

Eyestalks little longer than the reniform corneae are wide, hardly reaching beyond the middle of basal antennular article. Antennular peduncle hardly extending beyond the middle of the scaphocerite, 3rd article slightly longer than 2nd; the upper flagella are lost, the lower measure 185 mm., i. e. $1^4/_5$-times as long as the body. Stylocerite little longer than the eyestalks.

Antennal scale measuring two-thirds the length of the carapace, a little more than 4-times as long as wide, but slightly narrowed apically; the outer margin appears distinctly concave on the posterior third, slightly convex on the anterior and ends in a small spine, that is just surpassed by the truncate lamellar portion. Flagella 315 mm. long, just 3-times as long as the body.

External maxillipeds as long as in the variety *tenuipes* (A. Alcock, Descript. Catal. Indian Deep-Sea Crust. 1901, p. 88); last joint narrow, lanceolate, measuring two-thirds the length of the penultimate, terminal spine small, movable, 0,58 mm. long, one-tenth the length of the joint.

The legs of the 1st pair reach by the chelae and tip of carpus beyond the antennal scale, ischium with 4 spines, merus with one or 2, carpus 15 mm. long, almost 4-times as long as the chela (4 mm.), fingers 1,6 mm. long, a little more than one-third the entire length of the chela and clothed with long setae besides a tuft of short setae at the tips.

Peraeopods of the 2nd pair as long as the abdomen, reaching by their chelae and carpus beyond the antennal scales; ischium with a spine near the distal end, merus with 4 equidistant spines, the foremost of which is implanted a little beyond the middle. Carpus (25,5 mm.) longer and slenderer than that of 1st pair, proportion of their lengths like 3 : 5, chela (4,25 mm.) one-sixth the length of the carpus, as long as that of 1st pair but more slender, fingers one-third of the entire length, furnished with setae like in the first pair.

Legs of the 3rd pair 85 mm. long; ischium with a spine near the distal extremity, merus with 6 spines along its whole length, carpus unarmed, 31 mm. long, one-fifth longer than that of the 2nd pair and twice as long as the carpus of the 1st pair. Propodus very short, $^1/_{11}$ of the carpus, dactylus as long as propodus. Legs of the 4th pair resembling those of the 3rd, legs of the 5th pair wanting.

The rostrum is 14 mm. long, the carapace, measured in the middle line, 24,5 mm., the abdomen 68,5 mm., entire length 107 mm.

The variety *tenuipes* Bate, which was considered by Col. Alcock as a different species, does perhaps not differ from the variety *producta*, described above, but there is a tooth on the lower border of the rostrum, that is also slightly longer, the 1st pair of legs have smooth joints and the form of the antennal scale is perhaps different. *Nemat. ensifer* (S. I. Smith) var. *exilis* (Bate) from the eastern Atlantic seems to differ, according to Mr. Stanley Kemp's description in "Fisheries, Ireland, Sci. Invest., 1908, I. [1910], p. 75, Pl. IX, figs. 1—10" by the cervical groove that is well marked dorsally, by the telson which is sulcate above, by the different form of the outer margin of the scaphocerite, by the chelae of the 1st and the 2nd pair of peraeopods being slightly longer with regard to the carpus and probably by some other slight differences.

The typical species, finally, *Nemat. ensifer* (S. I. Smith) from the western Atlantic seems also to present some slight differences from the variety *producta*. As has already been observed, the cervical suture runs as a distinct sulcus from the dorsum of the carapace to the upper part of the hepatic region, the truncated tip of the antennal scale does not extend beyond the strong

tooth in which the thickened outer margin terminates, the 1st pair of legs do not reach beyond the antennal scale and the propodi of the following legs are apparently slightly longer. In order to establish with certainty the slight differences existing between the type species and these varieties, it should, however, be necessary to compare several specimens from the various localities where they are found.

General distribution: The variety *producta* Bate, which in the Report on the Challenger Macrura was described as a proper species, was obtained by the Challenger expedition near Yokohama, Japan, off Luzon, Philippine Islands, off Banda Island and off the New Hebrides.

2. *Nematocarcinus tenuirostris* Bate var. *Sibogae* de Man. Pl. VIII, Fig. 19—19*d*.

Nematocarcinus tenuirostris Sp. Bate, var. *sibogae* J. G. de Man, in: Zoolog. Mededeelingen, uitgegeven vanwege 's Rijks Museum van Natuurlijke Historie te Leiden, Deel III, Afl. 4, Dec. 1917, p. 279.

Nematocarcinus tenuirostris C. Spence Bate, Report Challenger Macrura, 1888, p. 817, Pl. CXXXII, Fig. 10.

Nematocarcinus tenuirostris A. Alcock, Catal. Indian Deep-Sea Crustacea. Decap. Macrura and Anomala in the Indian Museum, Calcutta 1901, p. 88.

Nematocarcinus tenuirostris M. J. Rathbun, The Brachyura and Macrura of the Hawaiian Islands, Wash. 1906, p. 926, Pl. XXIII, Fig. 6.

Stat. 300. January 30. 10° 48′.6 S., 123° 23′.1 E. 918 m. Bottom fine grey mud. 4 adult females, 3 of which are egg-bearing.

In the typical *Nemat. tenuirostris*, as described by Spence Bate and Miss Rathbun, the rostrum is from two-thirds to one-half as long as the rest of the carapace, projecting horizontally forwards, with the upper margin slightly convex (M. J. Rathbun, l. c. fig. 6) and with 9—13 dorsal and 1 or 2 ventral teeth. In the adult specimens, collected by the "Siboga" off the south coast of Rotti, the rostrum measures, however, somewhat more than two-thirds the length of the carapace proper and is more or less obliquely turned upward from the orbital margin to the tip; it is styliform, gradually tapering, quite straight, not at all convex in front of the eyes and armed on the upper margin with 8—10 teeth, on the lower with one and of the dorsal teeth 4 are constantly placed on the carapace posterior to the orbital margin. It is on account of these differences that these specimens are considered by me to belong to a distinct variety which is also found in the Gulf of Manár and the Bay of Bengal, because the species described by Col. Alcock did no doubt agree with our specimens from off the south coast of Rotti. Unfortunately Miss Rathbun, who had the opportunity of examining 275 specimens of this species, does not indicate the length of the body, but, according to Spence Bate, the female of the typical species should be 87 mm. long, but perhaps were the 7 specimens of the "Challenger" not yet full-grown. The largest specimen, measured by Alcock, was 117 mm. long, the length of our specimens varies between 119 and 146 mm. from tip of rostrum to tip of telson. Three females are egg-bearing, the fourth, which is the smallest of all, is not yet ovigerous, but it is certainly a female, because the pleopods of the 2nd pair bear only one appendix and no additional one. In this youngest specimen, that is, however, 119 mm. long, the 5 thoracic legs are all preserved, but in the three others they are wanting, except those

of the 1st pair. In the two largest females, respectively 146 and 140 mm. long, the rostrum extends a little, 3 or 2 mm., beyond the apex of the antennal scale, but in the youngest specimen it hardly reaches to the apex: in the fourth specimen the rostrum is broken off just before the distal extremity of the antennular peduncle. In the largest specimen the rostrum is $\frac{8}{7}$-dentate; the first four teeth of the upper margin are closely planted together, 3 on the carapace, the 4th above the orbital margin, the 5th is placed just before the eyes, the 6th still a little farther distant from the 5th as the 5th from the 4th, the 7th nearly in the middle of the rostrum proper and much nearer to the 6th than the 6th to the 5th, the foremost tooth, finally, a little beyond the middle of the rostrum, almost as far from the 7th as the 5th from the 4th and almost as far distant from the tip of the rostrum as from the 5th tooth. The single tooth of the lower margin is about 3-times as far distant from the tip of the rostrum as from the foremost tooth of the upper margin. In the second specimen, long 140 mm., the rostrum is $\frac{10}{7}$-dentate, the 7 proximal teeth are closely implanted, 4 on the carapace, the 5th above the orbital margin, the 8th tooth just above the distal extremity of 2nd antennular article, the 9th on the middle of the rostrum proper, just before the far end of the antennular peduncle, the foremost tooth as far from the 9th as the 9th from the 8th. The tooth on the lower margin twice as far from tip of rostrum as from the foremost tooth of the upper. In the female with broken rostrum the 5 proximal teeth are closely set, 4 on the carapace, the 5th just before the orbital margin, the 6th just before the eyes and little farther distant from the 5th as the 5th from the 3rd, the 7th opposite the middle of 3rd antennular article and almost as far from the 6th as the 6th from the 4th, the last tooth just before the apex of antennular peduncle, near the place where the rostrum is broken off. The rostrum of the youngest specimen is $\frac{9}{7}$-dentate; 4 teeth, closely planted together, on the carapace, the 5th just before the orbital margin, the 6th just in front of the eyes and as far distant from the 5th as the 5th from the 3rd, the 7th at the far end of 2nd antennular article, nearly as far from the 6th as the 6th from the 4th, the 8th at the far end of the peduncle and as far from the 7th as the 6th from the 5th, the foremost tooth, finally, one and a half as far distant from the tip of the rostrum as from the penultimate. Lower tooth 3-times as far distant from the tip as from the foremost of the upper margin, before which it is placed. The gastric carina is distinct, subacute and reaches to near the shallow transverse depression that separates the gastric from the cardiac region; like in *Nemat. ensifer* (S. I. Smith) var. *producta* Bate this depression is not united by a distinct sulcus with the lateral oblique part of the cervical groove, defining the gastric region posteriorly and passing at its lower end into a short transverse groove or dimple, which is much shorter than in that species. Branchio-cardiac groove rather indistinct, orbital angle and post-antennular spine as in the variety *producta* Bate of *Nemat. ensifer* (S. I. Smith), branchiostegal spine a little longer than the other, directed obliquely forward and downward; orbital furrow more or less distinct.

Abdomen 3-times as long as the carapace without the rostrum, resembling that of the variety *producta* Bate, but the posterior border of the 3rd tergum is less strongly and more obtusely produced in the middle line. Sixth somite twice as long as 5th, telson a trifle longer than 6th somite, exclusive the terminal spines, and bearing 8 or 9 pairs of dorso-lateral spinules, including the pair of spinules near the tip. Outer uropod slightly shorter than the telson,

exclusive the terminal spinules, inner uropod hardly reaching the terminal spinule of the outer border of the exopodite.

Different from the species collected at Stat. 227 the eyestalks that are a little longer than the eyes are wide, reach to near the far end of basal antennular article, while the pointed stylocerite reaches as far as the eyestalks or even a little beyond them. The antennular peduncle extends almost to the middle of the antennal scale, 3rd joint a little longer than 2nd as usual, flagella incomplete. Antennal scale measuring three-fourths the length of the carapace and 4,3—4,7-times as long as wide; it is a little narrowed apically, the truncate tip is surpassed by the terminal spine of the outer margin, except in the female with broken rostrum, in which the terminal spine extends as far forward as the tip of the blade. Outer margin less deeply concave on its proximal third than in the species from Stat. 227. Antennal flagellum of all the specimens wanting.

Of the external maxillipeds that reach about three-fourths of the way along the antennal scale, the narrow lanceolate terminal joint is but one-fifth shorter than the penultimate.

The peraeopods of the 1st pair, that are about as long as the carapace and the rostrum taken together, reach in the larger females by the chela and one-fifth of the carpus beyond the antennal scale, in the youngest female, long 119 mm., by one-third of the carpus. Ischium armed with 4 movable spinules on its lower margin — in the specimen, long 119 mm., only with 3 — merus with one spinule in the middle, which in the largest specimen does not occur; carpus a little more than one and a half as long as the merus, thickened apically, chela one-fourth of the carpus, fingers one-third the length of the chela.

As already remarked, the peraeopods of the 2nd—5th pair are only present in the female long 119 mm. Those of the 2nd pair measure two-thirds the length of the body and extend by the chela, carpus and one-fifth of the merus beyond the antennal scale. Ischium with a movable spine near the distal extremity of the lower border, merus with 5 spinules, carpus unarmed, one and a half as long as the merus, chela $^1/_8$ of the carpus, fingers about one-third the lengh of the chela.

The peraeopods of the 3rd pair are a little longer than the body and reach by the three last joints and two-thirds of the merus beyond the antennal scale. Ischium with 2 spines near the distal extremity, one on the inner, the other on the lower margin; merus with 7 spines on the upper border, of which the foremost on the thickened extremity is somewhat longer than the preceding, and with 6 on the lower, carpus unarmed, one-third longer than merus, the two last joints together $^1/_{10}$ of the carpus, dactylus half as long again as the propodus.

Peraeopods of the 4th pair hardly longer than those of the 3rd and reaching by the three last joints and three-fifths of the merus beyond the antennal scale. Ischium with a movable spine at the far end of the inner border, merus with 6 spines on the inner or upper border and with 5 on the lower, the 6th on the inner border at the thickened distal extremity being a little larger than the rest; carpus unarmed, one-third longer than the merus, dactylus hardly longer than the propodus, together $^1/_{11}$ of the carpus.

The legs of the 5th pair are the longest of all and one-fourth longer than the body; they reach by the three last joints and two-thirds of the merus beyond the antennal scale.

Ischium with a movable spine at the far end of the inner border, merus with 7 spines on the inner border, of which the foremost at the thickened distal extremity is longer than the rest, and with 5 on the lower; carpus more than half as long as the body and one-third longer than the merus, unarmed; dactylus rudimentary, only one-third of the propodus, both joints together $^1/_{20}$ of the carpus (Fig. 19*d*).

Eggs small, 0,7—0,75 mm. long, 0,5 mm. broad.

Measurements in millimeters.

	1	2	3
Length from tip of rostrum to tip of telson	119	140	146
Length of carapace, including rostrum	45	53,5	56
Length of carapace without rostrum	26	29	30,5
Length of rostrum	19	24,5	25,5
Height of carapace	13,5	14	15
Width of carapace	13	15,5	15
Length of eyestalk and eye	4	4,5	4
Greatest diameter of eye	2,75	3,5	3,5
Length of antennal scale	19,5	22	22
Width of antennal scale	4,1	5	5,1
Length of the leg of 1st pair	46	50	52
Length of merus	11,5	12,5	13,5
Length of carpus	19	20,5	21
Length of chela	4,75	5	5,5
Length of dactylus	1,5	1,7	1,75
Length of the leg of 2nd pair	84		
Length of merus	23		
Length of carpus	36		
Length of chela	4,5		
Length of dactylus	1,6		
Length of the leg of 3rd pair	125		
Length of merus	40		
Length of carpus	52,5		
Length of propodus	2,25		
Length of dactylus	3,25		
Length of the leg of 4th pair	130		
Length of merus	42		
Length of carpus	57		
Length of propodus	2,5		
Length of dactylus	2,75		
Length of the leg of 5th pair	147		
Length of merus	48		
Length of carpus	66		
Length of propodus	2,4		
Length of dactylus	0,85		
Length of 6th abdominal somite	16	18	19
Height of 6th abdominal somite	8	8,25	8,75
Length of telson	18	19,5	20

General distribution: The typical species is known from off Kandavu, Fiji Islands (Bate); South of the Philippine Islands (Bate); Hawaiian Islands (M. J. Rathbun). When the

species described by Col. ALCOCK should indeed prove to be identical with that which was collected by this expedition, the variety *Sibogae* should also occur in the Gulf of Manár and in the Bay of Bengal (ALCOCK).

3. *Nematocarcinus undulatipes* Bate. Pl. VIII, Fig. 20—20*h*.

Nematocarcinus undulatipes C. Spence Bate, Report Challenger Macrura, 1888, p. 801, Pl. CXXX.
Nematocarcinus undulatipes W. T. Calman, in: Guide to the Crustacea, Arachnida etc. exhibited in the Department of Zoology, British Museum (Natural History), London 1910, p. 52, Fig. 32 (photograph of a mounted specimen).
Nematocarcinus paucidentatus C. Spence Bate, l. c. p. 816, Plate CXXXII, Fig. 9.
Nematocarcinus cursor A. Alcock, Descr. Catal. Indian Deep-Sea Crustacea. Calcutta 1901, p. 89.
Nematocarcinus cursor, var. paucidentatus A. Alcock, l. c. p. 90.

Stat. 45. April 6. 7° 24′ S., 118° 15′.2 E. 794 m. Bottom fine grey mud, with some radiolariae and diatomes. 1 male and 1 young specimen which is badly damaged.
Stat. 88. June 20. 0° 34′.6 N., 119° 8′.5 E. 1301 m. Bottom fine grey mud; trawl chiefly brought up yellow mud. 1 young specimen.
Stat. 101. June 30. 6° 15′ N., 120° 21′ E. Sulu Sea. 1270 m. Bottom fine grey mud (Globigerinae). 1 adult female without eggs.
Stat. 122. July 17. 1° 58′.5 N., 125° 0′.5 E. 1264—1165 m. Bottom stone. 3 males.
Stat. 173. Aug. 28. 3° 27′ S., 131° 0′.5 E. 567 m. Bottom fine, yellow grey mud. 3 males.
Stat. 262. Dec. 18. 5° 53′.8 S., 132° 48′.8 E. 560 m. Bottom solid bluish grey mud, upper layer more liquid and brown mud. 28 specimens, viz. 22 ova-bearing and 3 younger females, 1 male and 2 very young specimens.
Stat. 314. Febr. 17, 1900. 7° 36′ S., 117° 30′.8 E. 694 m. Bottom fine, sandy mud. 1 male and 2 young females.
Stat. 316. Febr. 19, 1900. 7° 19′.4 S., 116° 49′.5 E. 538 m. Bottom fine, dark brown sandy mud. 4 young specimens.

At first I did hesitate to refer these specimens to *Nemat. undulatipes* of the Report on the Challenger Macrura, because the legs of the 1st and 2nd pair do not agree with BATE's figure on Plate CXXX, as regards the proportion between the length of chela and carpus: according to that figure the chela of the 1st pair should measure half the length of the carpus, while the chela of the 2nd pair should be even slightly longer than one-third of that joint. My presumption, however, that these legs are figured inaccurately, proved to be right, for, having applied to him for this question, Dr. CALMAN has very kindly examined for me the type specimens of this species and wrote me the following:

"A good many of the Challenger specimens of *Nematocarcinus undulatipes* have lost the first two pairs of legs. The largest specimen from Station 200 (off Sibago) is a female measuring about 93 mm. in total length and is in this condition. In a female (ovigerous) of more than 86 mm. (telson broken) the first legs extend beyond the antennal scale by less than one-third of the carpus; the carpus of first legs measures 16 mm. and the chela 4,5 mm.; in the second legs the carpus measures 30,5 mm. and the chela 4,5 mm. In an ovigerous female of 80 mm. total length the first legs have the carpus measuring 13,75 mm. and the chela 4 mm.; the second legs are wanting. The specimen from Station 194 (off Banda Island) has lost both first and second legs".

These measurements now fully agree with those of the specimens of this collection

(see the Table at p. 89) and therefore they certainly belong to this species. Professor ALCOCK, however, may also be right when considering the species which occurs in the Arabian Sea, the Gulf of Manár and the Bay of Bengal and which is no doubt the same as that which was collected by the "Siboga", as identical with *Nemat. cursor* A. M.-Edw. of the Antilles, for the species which was collected by the "Siboga", agrees indeed very well with the figure of *Nemat. cursor* in the "Recueil de Figures de Crustacés nouveaux ou peu connus", published by A. MILNE-EDWARDS in 1883, a copy of which I had the honour to receive from the author — nevertheless I not venture to follow him in this opinion, because the legs of the 2nd and of the 5th pair of our specimens show constant differences, as regards their measurements, from those of specimens of *Nemat. cursor* A. M.-Edw. taken off the east coast of the United States (S. I. SMITH, Report on the Decapod Crustacea of the Albatross Dredgings off the east coast of the United States during the summer and autumn of 1884. Wash. 1886, p. 62). The measurements of one male and three females are mentioned in this paper and I wish to call attention to the fact that some of SMITH's measurements and also a part of his description do not agree with the figure of *Nemat. cursor* in the above-mentioned "Recueil". This figure may therefore perhaps once prove to be partly inaccurate, which is made probable by the fact that the dactylus of the 5th leg shows in this figure the same size and shape as the dactylus of the two preceding legs, which is not the case in this species. Unfortunately in his description of *Nemat. cursor*, published in 1881, A. MILNE-EDWARDS has given no measurements at all of the legs.

The male from Stat. 45 is 87 mm. long from tip of rostrum to tip of telson. The rostrum extends almost to the middle of 3rd antennular article and is $\frac{10}{1}$-dentate; 5 teeth stand on the carapace, posterior to the orbital margin, and the tip of the rostrum is somewhat upturned. The telson, feebly furrowed longitudinally, bears 8 or 9 pairs of dorsolateral spinules, inclusive the pair near the tip; the spinules are implanted dorsally on the borders of the dorsal groove, except those of the 3rd and 5th pair, taking the hindmost as the first, which are placed more laterally, nearer to the lateral margins. The legs of 1st pair reach by the chela and one-third of the carpus beyond the antennal scale; the other legs are all partly wanting.

The young specimen from Stat. 88 is 38 mm. long. Rostrum $\frac{8}{1}$-dentate, reaching to the middle of 2nd antennular article, five teeth on the carapace. Legs of 1st pair extending by the chela and one-fourth of the carpus beyond the antennal scale. Sixth somite of abdomen 7 mm. long, 2,45 mm. broad, almost 3-times as long as broad, telson long 6 mm., without the terminal spines, and appearing as long as the outer uropod when the terminal spines are included.

The female without eggs from Stat. 101, in which the rostrum is broken off, is 87 mm. long from the far end of antennular peduncle to tip of telson and appears therefore almost adult. Carpus of the 1st pair of legs 13,4 mm. long, reaching by a little more than one-fifth of its length, viz. 3 mm., beyond the antennal scale, chela 3,4 mm. long, one-fourth of the carpus. Legs of the 2nd pair 66 mm. long, extending by the chela, the carpus and one-fourth of the merus beyond the antennal scale; merus 19 mm. long, carpus 27,5 mm., chela 3,5 mm. Legs of the 4th pair 76 mm. long, almost as long as the body, and extending by the chela, the carpus and one-third of the merus beyond the antennal scale: merus, carpus, propodus and dactylus

respectively 23,5 mm., 29,5 mm., 2,5 mm. and 2,75 mm. long. The other legs are wanting. Telson like in the preceding specimen with 8 pairs of dorso-lateral spinules.

The largest male from Stat. 122 is full-grown, 93 or 94 mm. long, the carapace, rostrum included, being 27 mm. long. The rostrum that measures 7 mm., extends almost to the middle of 3rd antennular article and is $\frac{14}{1}$-dentate; 5 teeth stand on the carapace, the 6th above the orbital margin and the teeth are closely placed together; the distance between the foremost tooth and the tip of the rostrum measures one-third of the latter and this unarmed tip is slightly upturned. The tooth on the lower margin is situated midway between the foremost tooth of the upper margin and the apex of the rostrum. Sixth somite of abdomen 13,5 mm. long, 5,75 mm. broad, telson 15 mm. long; the telson, faintly grooved longitudinally on the anterior half and flattened on the posterior, is armed with 7 somewhat irregularly planted, dorso-lateral spinules, including those near the tip, and is as long as the outer uropod, when the terminal spinules are excluded. In the second, somewhat smaller male the rostrum runs straight forward almost to the distal extremity of the antennular peduncle and the tip is hardly upturned; the upper border bears 9 teeth, four of which are on the carapace, the 5th above the orbital margin; the teeth are not of the same form and close set like in the preceding specimen, but the penultimate and the antepenultimate tooth are farther distant from one another and from the 6th, i.e. longer, than the other teeth. The tooth on the lower margin is very small, directed straight forward (not downward as in the largest male) and one and a half as far distant from the tip of the rostrum as from the foremost tooth of the upper margin. In this specimen the legs are also wanting.

The youngest male from Stat. 122 measures 65 mm., the carapace, rostrum included, being 20,2 mm. long. The rostrum, 5,45 mm. long, resembles that of the preceding specimen and reaches just beyond the middle of 3rd antennular article; the upper margin is armed with 10 teeth, the 5th stands above the orbital margin, but the penultimate and the antepenultimate tooth are not longer than the rest; apex of rostrum and lower tooth as in the preceding male. Sixth abdominal somite 9,2 mm. long, 4,25 mm. broad; telson 10,25 mm. long, only as long as the inner uropod and distinctly shorter than the outer, with 9 pairs of dorso-lateral spinules. The carpus, long 10,5 mm., of the 1st pair of legs projects almost by one-third of its length beyond the antennal scale; chela 3,25 mm. long, nearly one-third of the carpus.

The three males from Stat. 173 are nearly of equal size, almost full-grown. The largest specimen is 80 mm. long, the carapace measuring 24,5 mm., rostrum included. The rostrum, 5,45 mm. long, reaches to the far end of 2nd antennular article; the upper border, slightly concave above the orbital margin, while the tip is not upturned, is armed with 12 teeth, 6 of which stand on the carapace; the three distal teeth are farther distant from one another, i.e. a little longer, than the rest. Tip of anterior tooth one and a half as far distant from the tip of the rostrum as from that of the penultimate. Tooth on lower margin small, directed forward. The telson hardly reaches by its terminal spinules the tip of the outer uropod. The carpus, long 14 mm., of the 1st pair of legs extends by one-third of its length beyond the antennal scale. Other legs wanting.

The rostrum of the 2nd specimen, long 78 or 79 mm., resembles that of the first and is also $\frac{6}{1\frac{2}{1}}$-dentate, but the foremost tooth is as far distant from the tip of the rostrum as from

the penultimate and one and a half as far distant from the penultimate as the penultimate from the antepenultimate. The peraeopods of the 1st pair measure 33 mm. and the distal third of the carpus, which is 13,5 mm. long, reaches beyond the antennal scale. Legs of the 2nd pair 66 mm. long, the merus, long 17 mm., extends by a little more than one-third its length, viz. 7 mm., beyond the antennal scale; carpus 28 mm. long, chela 3,75 mm. Other legs lost.

In the 3rd specimen, finally, the rostrum reaches just beyond the 2nd antennular article and is armed above with 14 teeth, six of which are on the carapace, the 7th above the orbital margin; the teeth are closely set, except the 10th and the 11th, which are farther distant from one another and from the 9th than the rest, appearing therefore longer; tip of rostrum a little upturned. Lower tooth midway between the tip and the foremost tooth of the upper margin. All the legs are wanting.

The 28 specimens from Stat. 262 are mostly well preserved, as regards the legs etc., 22 are ova-bearing females, but there is only one male, which is 70 mm. long, while the carapace, rostrum included, measures 21,5 mm. The measurements of 5 ova-bearing females and one young female are indicated in the Table at p. 89. The largest egg-bearing female measures 104 mm. from tip of rostrum to tip of telson, while the smallest female, provided with eggs, is 75 mm. long. The single specimen of *Nemat. paucidentatus* Bate, collected by the "Challenger", was 100 mm. long and the carapace, rostrum included, measured a little less than one-third the length of the animal, exclusive of the rostrum and the telson (C. Spence Bate, l. c. p. 816). In all the specimens from Stat. 262, like also in those from the other Stations, the carapace, rostrum included, measures a little more than one-third the length of the animal, without rostrum and telson: the measurements of the female and of the male of *Nemat. undulatipes*, mentioned by Bate (l. c. p. 802), on the contrary, agree very well with those of the "Siboga" species. As regards the relative length and shape of carapace and abdomen, the "Siboga" specimens resemble also the figure of *Nemat. cursor* A. M.-Edw. in the above-mentioned "Recueil" and agree likewise with the measurements published by S. I. Smith (l. c.), but the dorsal border of the cardiac region, that in this figure runs quite straight, appears in our specimens, however, slightly convex.

Excepting the two youngest individuals, like also an ova-bearing female in which the rostrum is broken off, the rostral formulae of 25 specimens from Stat. 262 are the following. In 3 specimens, all ova-bearing, the upper margin is armed with nine teeth, in 5, three of which are ova-bearing, with ten, in 8, namely in the male and in 7 females, 6 of which are ova-bearing, with eleven, in 4, all ova-bearing, with twelve, in 3, all with eggs, with thirteen and in 2, also ova-bearing, with fourteen teeth, so that in two-thirds of the specimens 9—11 (usually 11) teeth are observed and only in one-third 12—14. Excepting 3 ova-bearing specimens the lower border is constantly armed with one tooth near the tip. In more than half the number of the specimens, namely in 13, five teeth of the upper margin are implanted on the carapace proper, in 8 specimens six, in 3 four and only in 1 specimen, an egg-bearing female, seven teeth occur behind the orbital margin. Among 20 specimens the rostrum did extend in 9 to the distal extremity of 2nd antennular article, in 10 to the middle of 3rd and only in one ova-bearing female to the far end of the peduncle. The tip of the

rostrum is often a little upturned and sometimes the whole rostrum is slightly ascendant; like in the males from the Stations 122 and 173 some teeth on the rostrum proper are often longer, i. e. more distant from one another, than the rest.

We may conclude from the preceding observations that the number of teeth on the upper margin of the rostrum varies rather much, from 9 to 14, and ALCOCK's suggestion that a variety with 7—9, usually 9, teeth should be distinguished from a more typical form with 13—15 teeth, appears therefore not justified: in the species, examined by that author, usually 15 teeth were placed on the upper border, in the "Siboga" specimens 11, as has been indicated above. Post-rostral carina distinct, reaching to near the after limit of the gastric region. A microscopical tubercle, 0,3 mm. broad, exists in the middorsal line of the cardiac region, about at the posterior fourth. Like in *Nemat. ensifer* (S. I. Smith) var. *producta* Bate and in *Nemat. tenuirostris* Bate var. *Sibogae* the shallow depression between the gastric and cardiac region does not continue into the oblique lateral part of the cervical groove, which for the rest agrees with that of these two species. Branchio-cardiac groove well defined, curved, not reaching the posterior margin of the carapace nor uniting anteriorly with the cervical groove. Orbital groove distinct.

Abdomen a little more than twice as long as the carapace, rostrum included. Third abdominal tergum moderately prominent posteriorly. Sixth somite in adult individuals twice as long as broad. Telson constantly a little longer than 6th somite, flattened and slightly grooved dorsally, with 8 or 9 pairs of dorsolateral spinules; the tip is armed with 3 pairs of spinules, one pair at the extremity, at each side of which the spinules of the longest pair are implanted, while those of the 3rd pair, the shortest of all, are implanted above those of the 2nd. While in some specimens the telson extends by the terminal spinules beyond the outer uropods, in other ones, as in the female N° 1 of the Table, it is much shorter and does even not reach the tip of the endopodite.

Like in the specimens of *Nemat. cursor* A. M.-Edw. from off the east coast of the United States, the length of the eye and stalk does equal or exceed the breadth of the antennal scale; the eye extends almost to the far end of basal antennular article. In most specimens the terminal spine of the scaphocerite reaches just beyond the tip of the blade. The antennular peduncle, which is slightly longer than the rostrum, extends almost to the middle of the scaphocerite; 3rd article a little longer than 2nd, stylocerite slightly shorter than basal article. Upper flagellum $2^1/_2$-times as long as the animal from tip of rostrum to tip of telson, lower flagellum a little more than 3-times that length; the former somewhat thickened at base to a little beyond the tip of the antennal scale, this thickened portion a little longer than the peduncle. Antennal flagellum just as long as the lower flagellum of the upper antennae.

The external maxillipeds reach in the adult female, long 104 mm., six-sevenths of the way along the antennal scale; the penultimate joint reaches as far forward as the antennular peduncle, terminal joint shorter than the penultimate with the spine at the distal extremity very small.

The peraeopods of the 1st pair extend by the chela and one-third or sometimes even less than one-third of the carpus beyond the antennal scale; as regards their measurements they agree with *Nemat. cursor* A. M.-Edw. from the east coast of the United

States (S. I. Smith, l. c.), in the figure of the "Recueil", however, the chelae measure just one-third of the carpus, while, according to Smith, their length should be only one-fourth or little more. The ischium is armed with 3 or 4 movable spinules along the lower border, the merus with one spinule just behind the middle, sometimes with a second between it and the proximal articulation; carpus unarmed, slightly and gradually thickened distally.

The legs of the 2nd pair project by the chela, carpus and $^1/_6$ or $^1/_7$ of the merus beyond the antennal scale. As results from comparing the measurements on the Table with those that are mentioned by Smith, the 2nd legs should in the species, collected by the "Siboga", like in the *Nemat. cursor* of Alcock, be somewhat shorter in proportion to the entire length than in *Nemat. cursor* A. M.-Edw. from the east coast of the United States: in the indian species the 2nd legs measure just three-fourths the length of the animal, while they should be, according to Professor Smith, in *Nemat. cursor* nearly as long as the animal or but little shorter. Another difference is shown by the chelae, which in *Nemat. undulatipes* measure one-seventh of the carpus, but, according to S. I. Smith, in *Nemat. cursor* scarcely more than a tenth. In the figure of *Nemat. cursor* in the "Recueil" of 1883 the 2nd legs appear, however, even a little shorter than in the "Siboga" species and the carpus appears but 5-times as long as the chela! In the "Siboga" species the ischium is armed with a movable spinule not far from the proximal extremity and with another near the far end, the merus with 3 or 4 movable spinules along the posterior border and another at the upper side of the thickened distal extremity.

The legs of the 3rd and of the 4th pair show nearly the same measurements as are mentioned by S. I. Smith. The legs of the 3rd pair, about as long as the animal, though not shorter, project by half the merus beyond the antennal scale; the carpus is one-third, rarely one-fifth, longer than the merus and the dactylus, which is slightly waved, is $1^1/_2$—$1^2/_3$-times as long as the propodus. Ischium armed on the lower border with a small spine near the base and with a larger one near the distal extremity; merus with 3—5 small spinules both on the lower and the upper border and with a somewhat larger spine on the upper side of the thickened distal extremity.

The peraeopods of the 4th pair are as long as those of the 3rd and reach also by one-half the merus beyond the antennal scale; the spinulation of ischium and merus is the same, but the dactylus is comparatively shorter, being only one-fifth longer than the propodus.

While, according to Smith, in the female of *Nemat. cursor* A. M.-Edw. from off the east coast of the United States the legs of the 5th pair should be as long as those of the 3rd and the 4th, namely just as long as the animal, they appear in the female specimens of *Nemat. undulatipes* considerably longer, namely one-fourth longer than the distance between tip of rostrum and tip of telson; another difference is presented by the carpus, which in the indian form is longer with regard to the merus, namely about one and a half as long as the latter. Dactylus rudimentary, measuring hardly one-third of the propodus. Except the terminal joints, the three posterior legs of the "Siboga" species resemble pretty well the figure in the "Recueil". The legs of the 5th pair project also by half the merus beyond the antennal scale and the spinulation of ischium and merus is the same as in the 3rd and 4th pair of legs.

The male from Stat. 314 is 80 mm. long, the carapace, rostrum included, 23,5 mm., the rostrum 5,7 mm., sixth abdominal somite 10,5 mm. long and 5,6 mm. broad, telson 11,75 mm. long. The rostrum that reaches to the middle of 3rd antennular article, is $\frac{10}{1}$-dentate; 5 teeth stand on the carapace, the 6th above the orbital margin, the first 8 teeth are closely-set, the 9th appears a little longer, but the foremost tooth is almost twice as long as the penultimate and its distance from the apex of the rostrum that is slightly upturned, is a little longer than its distance from the penultimate tooth. Inferior tooth near tip of rostrum. Telson hardly longer than outer uropod. Legs wanting.

The larger female measures about 56 mm., the carapace, rostrum included, being 16,75 mm. long, sixth abdominal somite 8 mm. long and 4 mm. broad, telson 8,4 mm. long. The rostrum, 3,5 mm. long and hardly reaching beyond basal antennular article, is $\frac{9}{1}$-dentate; 4 teeth stand on the carapace, the foremost tooth is somewhat longer than the preceding and a little longer than its distance from the tip of the rostrum which is not upturned. The peraeopods of the 1st pair reach by one-fifth of the carpus beyond the antennal scale, the measurements of the legs are indicated in the Table. The other female is younger and the legs of the 1st pair extend only by $\frac{1}{8}$ of the carpus beyond the antennal scale. Rostrum $\frac{11}{1}$-dentate, reaching to the middle of 2nd antennular article.

The largest of the 4 specimens from Stat. 316 measures 50 mm., the carapace, rostrum included, being 15,5 mm. long. The rostrum, which is 3,1 mm. long, reaches hardly beyond 1st antennular article and the apex is not turned upward; upper margin with 11 teeth, of which the 6th stands above the orbital margin and the anterior of which is a little longer than the preceding. The legs of the 1st pair extend by one-third the carpus beyond the scaphocerite and the dactyli of the 3rd pair are one and a half as long as the propodus. In another specimen, about of the same size, the rostrum is also $\frac{11}{1}$-dentate, but there is a large hiatus between the 9th and the 10th tooth, evidently an abnormality; anterior tooth very small, tip horizontal. Legs wanting. In the two last specimens the 1st pair extend respectively by one-third and one-fifth of the carpus beyond the antennal scale, the rostrum is in the latter $\frac{9}{1}$-dentate, in the other $\frac{11}{1}$; the other legs are also wanting.

Table of measurements in millimeters of *Nemat. undulatipes* Bate.

	1	2	3	4	5	6	7
Length from tip of rostrum to tip of telson .	104	95	94	91	80	78	56
Length of carapace, including rostrum . . .	33	29,5	28,5	28,25	24	23,5	17
Length of carapace without rostrum	24	22,1	22	21,25	18,5	18	13,6
Length of rostrum.	9	7,4	6,5	7	5,5	5,5	3,4
Length of 6th abdominal somite.	14	12,7	12	12	10,25	11	8
Breadth of 6th abdominal somite	6,6	6,4	6,1	5,75	5,2	5	4,1
Length of telson	15,5	15,3	14,5	14,5	12,5	12,5	8,5
Length of eyestalk and eye	3,8	3,9	3,75	3,5	3,25	3,1	2,3
Greatest diameter of eye	3	3,1	2,75	2,9	2,45	2,4	2
Length of antennal scale	18	16,2	16	15,25	14	14	9,5
Breadth of antennal scale	4	3,5	3,45	3,75	2,75	2,8	2
Length of last joint of outer maxilliped . . .	7	6,75	6,5	4,75	5	4,75	3,5
Length of penultimate joint of outer maxilliped	9	8,25	7,75	8	6,5	6,5	4,5

	1	2	3	4	5	6	7
Length of first leg	41,5	40	39	39	33	33	22,5
„ „ merus	10,5	10	9,5	10	8,5	8,5	5,5
„ „ carpus	16,5	15,75	15,4	15,5	14	13,25	8,75
„ „ chela	4,75	4,4	4	4	3,75	3,75	2,6
„ „ dactylus	1,6	1,5	1,5	1,4	1,3	1,4	
Length of second leg	76	70	69	68		61	
„ „ merus	21,5	19,5	19	18,5		16,5	12,5
„ „ carpus	31,5	29	28,5	28,5		24,5	
„ „ chela	4,5	4,25	4,1	4,2		3,8	
„ „ dactylus	1,5	1,5	1,5	1,5		1,4	
Length of third leg	114	101	102	98	94	94	66
„ „ merus	35,5	31	33	29	28	30	20,5
„ „ carpus	46	41,5	41	40	38	36	24
„ „ propodus	3	2,75	3	2,75	2,75	3	2,3
„ „ dactylus	5	4	4,5	4,25	4,5	4,5	4
Length of fourth leg	115	106	108	100		94	65
„ „ merus	36	33	33	31,5		30	21,5
„ „ carpus	49	46,5	46,5	44		39,5	25
„ „ propodus	2,75	2,5	2,5	2,5		2,5	2,25
„ „ dactylus	3,25	3	3	2,75		3	3,25
Length of fifth leg	129	119	118	118			64
„ „ merus	41	39	39	37			22
„ „ carpus	59	53,5	54	56			27
„ „ propodus	2,6	2,5	2,5	2,5			2
„ „ dactylus	0,75	0,7	0,7	0,75			0,4

N° 1—4 and 6, ova-bearing females from Stat. 262; N° 5 female without eggs from Stat. 262; N° 7 young female from Stat. 314.

General distribution: *Nematocarcinus undulatipes* Bate is known from off Sibago, Philippine Islands and from off south of the latter, from north of the Kermadec Islands and from off Banda (Spence Bate); the same species has been observed in the Arabian Sea, the Gulf of Manár and the Bay of Bengal (Alcock) and, when *Nemat. paucidentatus* Bate is identical, also off Kandavu, Fiji Islands.

4. *Nematocarcinus gracilis* Bate. Pl. VIII and IX, Fig. 21—21 *h*.

Nematocarcinus gracilis C. Spence Bate, Report Challenger Macrura, 1888, p. 815, Pl. CXXXII, Fig. 8.

Nematocarcinus gracilis A. Alcock, Descr. Cat. Indian Deep-Sea Crust. Decap. Macr. Anom., Calcutta, 1901, p. 90.

Nematocarcinus gracilis M. J. Rathbun, The Brachyura and Macrura of the Hawaiian Islands, Wash. 1906, p. 927.

Stat. 262. Dec. 18. 5° 53′.8 S., 132° 48′.8 E. 560 m. Bottom solid bluish grey mud, upper layer more liquid and brown mud. 2 males and 4 females, 3 of which egg-bearing.

Stat. 300. January 30, 1900. 10° 48′.6 S., 123° 23′.1 E. 918 m. Bottom fine grey mud. One adult female without eggs.

This species, though closely resembling *Nemat. undulatipes* Bate, may easily be distinguished

1^0 by the larger number (14—22) of teeth on the upper margin of the rostrum, 2^0 by the longer legs, especially those of the 1st pair that extend by half or more than half the carpus beyond the antennal scale, being a little more than one and a half as long as the carapace, rostrum included, 3^0 by the dactyli of 3rd and 4th pair of legs which are not longer, but distinctly shorter than the propodi.

The largest of the 7 specimens is the female from Stat. 300, which is 114 mm. long: unfortunately the legs are wanting, except the 1st pair. The rostrum (Fig. 21*d*), gently ascendant, reaches almost to the middle of 3rd antennular article; the upper margin, that is slightly concave above the eyes, is armed with 14 close-set teeth, 7 of which stand on the carapace, while the foremost is placed, in front of the eyes, just beyond the middle of the rostrum proper, between this tooth and the apex the upper margin runs quite straight. The lower tooth, directed forward and downward, is situated about midway between the foremost tooth and the tip of the rostrum. In the two males from Stat. 262 the rostrum runs straight forward to a little beyond 2nd antennular article and is $\frac{14}{1}$-dentate; 6 teeth stand on the carapace, the anterior tooth just beyond basal antennular article, so that the, slightly upturned, distal unarmed part of the upper margin appears rather short. The lower tooth which is directed horizontally forward, is placed, in the larger male, just before the foremost tooth of the upper border, in the other midway between this tooth and the tip. In the egg-bearing female the rostrum is horizontal and extends a little beyond 2nd antennular article; the upper border is armed with 14 teeth, 7 of which stand on the carapace, while the foremost is implanted just on the middle of the rostrum proper, so that the distal unarmed part appears just as long as the distance between the foremost tooth and the orbital margin. The lower tooth is placed twice as far from the foremost tooth as from the apex of the rostrum. In the second female the rostrum, of which the unarmed distal part is slightly upturned, extends a little beyond 2nd antennular article and bears 16 teeth, 7 of which stand on the carapace, while the anterior tooth is implanted above the far end of basal antennular article; the two anterior teeth are a little larger, i. e. longer, than the preceding and the unarmed distal part measures one-third the length of the rostrum proper. The well-developed lower tooth is directed horizontally forward and placed midway between the anterior tooth and the tip. The rostrum of the third ova-bearing female resembles that of the second, but of the 16 closely-set and equally long teeth 6 stand on the carapace and the tip is hardly upturned. The female without eggs belongs no doubt to this species, because the legs of the 1st pair reach about by two-thirds of the carpus beyond the antennal scale, but the rostrum that extends horizontally to the far end of 2nd antennular article, seems to bear only 12 teeth, for the 3 anterior are broken off; 6 stand on the carapace and the unarmed part of the upper border is almost half as long as the rostrum.

For the rest the carapace of this species resembles that of *Nemat. undulatipes* Bate and the abdomen does also not appear to differ, the posterior border of the 3rd abdominal tergum being as much produced in the middle line and the telson presenting the same form and length.

Also as regards the eyestalks and eyes and the two pairs of antennae both species apparently resemble one another.

According to the Table of measurements on p. 89 in *Nemat. undulatipes* Bate the 1st pair of legs are shorter than twice the length of the carapace, the rostrum excluded, in *Nemat. gracilis*, however, longer than twice the length of the carapace without the rostrum and, while in the former these legs reach only by one-third of the carpus or still less beyond the antennal scale, in *Nemat. gracilis* one-half to more than two-thirds of the carpus extend beyond the scaphocerite. In the two males from Stat. 262 two-thirds of the carpus reach beyond the antennal scales, in three females three-fifths, in the fourth female and in the female from Stat. 300 one-half the length of the carpus. The spinulation of ischium and merus is the same as in *Nemat. undulatipes.*

Owing probably to the specimens from Stat. 262 being not yet full-grown, the legs of the 2nd pair are still distinctly shorter than the entire body, while, according to Col. Alcock, whose largest female measured 84 mm., they should be nearly as long as it; these legs project, in the ova-bearing females from Stat. 262, by the chela, carpus and about one-third of the merus beyond the antennal scale. The chela measures one-sixth the length of the carpus, but for the rest the relative measurements agree with those of *Nemat. undulatipes*; the spinulation of the ischium is the same as in this species, the merus, however, is not only armed with 4 or 5 spinules on the posterior border, but the opposite border bears also 3 or 4 similar spinules, besides the somewhat larger spine at the thickened distal extremity.

Quite characteristic are the legs of the 3rd and 4th pair. The peraeopods of the 3rd pair are in our specimens nearly as long as the entire body, while in full-grown individuals they are very much longer than it; they project by the chela, the carpus and two-thirds of the merus beyond the antennal scale. The proportion between the length of merus, carpus and propodus is the same as in *Nemat. undulatipes*, but the dactyli, in stead of being longer, are in *Nemat. gracilis* distinctly shorter than the propodi, measuring only two-thirds or three-fifths of these joints; the dactyli have a characteristic, waved form. Spinulation like in *Nemat. undulatipes*, but the proximal spinule of the ischium seems to be wanting.

The legs of the 4th pair are about as long as the 3rd and project in the male by two-thirds, in the female by three-fifths of the merus beyond the antennal scale; these legs are in our specimens comparatively shorter than in *Nemat. undulatipes* and, like in the 3rd pair, the dactyli measure only two-thirds of the propodi, while they show the same form as in these legs. Spinulation like in the 3rd pair. Unfortunately the legs of the 5th pair are only complete in the larger male from Stat. 262, they are here a little shorter than the body and project by about one-third of the meri beyond the antennal scale; the ischium is unarmed and the spinules of the merus are also less in number than in the two preceding legs. Terminal joints like in *Nemat. undulatipes.*

Like the typical specimens collected by the "Challenger", also the specimens from Stat. 262 were taken together with the numerous individuals of *Nemat. undulatipes* Bate.

Measurements in millimeters of *Nematocarcinus gracilis* Bate.

	1	2	3	4	5
Length from tip of rostrum to tip of telson	72	77	75	74	112
Length of carapace, including rostrum	19,75	22,4	22,5	20,5	32,5
Length of carapace, without rostrum	14,35	17	16,5	15	24
Length of rostrum	5,4	5,75	6	5,5	8,75
Length of sixth abdominal somite	10,25	11	11	10,25	15
Breadth of sixth abdominal somite	4,6	5,25	5,25	4,6	7
Length of telson	11,25	12	12,3	11,25	16
Length of eyestalk and eye	3,5	3,4	3,5	3,4	4,75
Greatest diameter of eye	2,7	2,6	2,6	2,4	3,5
Length of antennal scale	11,5	12,5	12,3	11,4	18,5
Breadth of antennal scale	2,5	3	2,9	2,7	4
Length of terminal joint of outer maxilliped	4,5	5	4,75	4,4	7,25
Length of penultimate joint of outer maxilliped	6,4	6,5	6,5	6	9,5
Length of the leg of 1st pair	34	36	37	34	52
„ „ merus	9	9,25	10	8,5	14
„ „ carpus	14	14	14,5	13	21
„ „ chela	3,6	4	4	3,75	5,5
„ „ dactylus	1,25	1,4	1,4	1,3	1,75
Length of the leg of 2nd pair		61	60	57	
„ „ merus		16,5	16,5	15	
„ „ carpus		24,5	24,5	23	
„ „ chela		4,2	4	4	
„ „ dactylus		1,4	1,3	1,3	
Length of the leg of 3rd pair	69	78	79	76	
„ „ merus	20	25	25	24	
„ „ carpus	28	31,5	32	29,5	
„ „ propodus	2,4	2,75	2,5	2,5	
„ „ dactylus	1,6	1,75	1,75	1,5	
Length of the leg of 4th pair	62		80	70	
„ „ merus	17		26,5	22	
„ „ carpus	25,5		32,5	28	
„ „ propodus	2,25		2,4	2,25	
„ „ dactylus	1,5		1,75	1,5	
Length of the leg of 5th pair	67				
„ „ merus	19		26,5	24	
„ „ carpus	27,5				
„ „ propodus	2				
„ „ dactylus	0,7				

N° 1 male, N° 2—4 ova-bearing females from Stat. 262; N° 5 female from Stat. 300.

General distribution: North of the Kermadec Islands (Bate); off Kandavu, Fiji Islands (Bate); Hawaiian Islands (Rathbun); Arabian Sea, in the neighbourhood of the Laccadives and south-eastwards (Alcock).

Superfamily PANDALOIDA.

Family Thalassocaridae.

Thalassocaris Stimps.

This genus, the only one of the family, includes at present four species and one variety. *Thalass. Danae* Bate, which was taken near the Fiji Islands at the surface, should, as was already suggested by Dr. Balss (Ostasiat. Decapoden, II, 1914, p. 27), be regarded as an immature form, probably of *Thalass. lucida* (Dana), while *Thalass. Stimpsoni* Bate seems to be a larval form, probably not pertaining to this genus. All the species are indopacific. *Thalass. crinita* (Dana), first recorded from the Sulu Sea, was also taken by the "Siboga" at two Stations of the Sulu Islands, furthermore off Biaru-island, near the north point of Celebes and between Nusa-Besi and the N. E. point of Timor; this species occurs in the Western Indian Ocean and has also been observed at Dzushi, Japan, while a variety was captured by the "Siboga" off the island of Saleyer. *Thalass. lucida* (Dana) has been found off Assumption Island, one of the Ladrones, west of the Bonin-islands, in the Pacific and near Christmas Island: this species will therefore certainly prove to occur also in the Indian Archipelago. The two other species, *Thalass. affinis* Borr. and *Thalass. maldivensis* Borr., are known from the Maldives and Saya de Malha.

The species of *Thalassocaris* are found in shallow water.

LIST OF THE SPECIES OF THALASSOCARIS Stimps., KNOWN AT PRESENT 1918.

SPECIES	HABITAT	DEPTH IN FATHOMS
affinis Borr. 1915	Maldives	At various depths down to 26.
	Saya de Malha	" " " " " "
crinita (Dana) 1852	Dzushi, Japan	71
	Sulu Sea	
	Tawi-Tawi-islands	7
	Anchorage of North-Ubian	9—12
	Anchorage on the east coast of Kajoa-island	Plankton, surface.
	Biaru-island	20—15
	Between Nusa-Besi and the N.E. point of Timor	15—30

SPECIES	HABITAT	DEPTH IN FATHOMS
	Amirante Islands	In various depths down to 80.
	Maldives	" " " " " "
	Seychelles	" " " " " "
crinita (Dana) var.?	Off Saleyer-island	Up to 20.
Danae Bate 1888	Fiji Islands	Surface.
lucida (Dana) 1852.	Off Assumption Island, Ladrones	
	West of the Bonin Islands	
	Pacific	
	Christmas Island	
maldivensis Borr. 1915 . .	Maldive Islands.	

1. *Thalassocaris crinita* (Dana). Pl. IX, Fig. 22—22*o*.

Regulus crinitus J. D. Dana, Unit. Stat. Expl. Exp. Crust. 1852, p. 599, Pl. 39, Fig. 6*a—h*.
Thalassocaris crinitus H. Balss, Ostasiatische Decapoden II, München, 1914, p. 28.

Stat. 93. June 24/25. Pulu Sanguisiapo, Tawi-Tawi-islands, Sulu-archipelago. 12 m. Lithothamnion-bottom, sand and coral. 1 adult male and 1 egg-laden female.
Stat. 99. June 28/29/30. 6° 7'.5 N., 120° 26' E. Anchorage of North-Ubian. 16—23 m. Lithothamnion-bottom. 2 ova-bearing females.
Stat. 123. North-bay, Biaru-island. 36—27 m. Stone and Lithothamnion-bottom. 1 adult male.
Stat. 138. August 3. Anchorage on the east coast of Kajoa-island. Plankton, surface. 1 adult and 2 young males.
Stat. 282. January 15/17, 1900. 8° 25'.2 S., 127° 18'.4 E. Anchorage between Nusa Besi and the N. E.-point of Timor. 27—54 m. Bottom sand, coral and Lithothamnion. 1 adult male, 1 ova-bearing female and 1 young male.

The 11 well-preserved specimens, 8 of which are adult and full-grown, make it possible to contribute to our knowledge of this apparently rare species. The rostrum, the postrostral carina of which commences nearly on the middle of the carapace, appears in all the specimens a little less high and therefore a little more slender than in DANA's figure 6*a*; it is at first rather strongly depressed and in most specimens runs then horizontally forward to the tip, but in those from the Station 282 the distal part is more or less upturned, especially in the ova-bearing female. In this female and in that from Stat. 93 the upper margin is armed with 9 teeth, in all the other specimens, however, with 8, according to DANA the rostrum should be armed dorsally with 9 or 10 teeth; constantly two teeth stand on the carapace behind the orbital margin, the 3rd above or just before the latter. The dorsal teeth slightly increase in size distally, like also the distances between them, so e. g. in the male from Stat. 93 the anterior tooth is as far distant from the apex as from the penultimate and the latter one-fifth farther distant from the foremost as from the antepenultimate, in the male from Stat. 282, however, the distances between the three distal teeth and that between the foremost tooth and the tip are equal. Like in the female, recorded by BALSS from Japan (l. c.), in all the specimens the rostrum bears ventrally 3 teeth, while DANA describes and figures 2 only; usually the 1st or proximal tooth is the smallest, the 2nd the largest of the three, in the female from Stat. 282 the 1st and the 3rd are equal and a little smaller than the 2nd; the ventral teeth are placed

just below or a little before the three distal teeth of the upper border. The characteristic lateral dilatation of the rostrum agrees with DANA's figure 6*b*: it is like a roof, below which the eyes may be concealed. The outer orbital angle is spiniform, acute, but this spine is much smaller than the supra-orbital spine; between the latter and the orbital margin the carapace bears 5 or 6 transverse winkles. Antennal spine small, obtuse. Antero-inferior angle of carapace rounded. A longitudinal ridge or carina runs near and parallel with the lower border of the carapace.

In the adult species the spine of the 3rd abdominal tergum extends to the middle or to just behind the middle of the 4th. Like in *Chlorotocus spinicauda* de Man the abdominal pleura are spinose in the male, hardly so in the female. In the male the postero-inferior angle of the 1st pleuron is produced into a long spine, that is directed backward, while the anterior angle is rounded and the lower edge slightly concave; the pleura of the 4 following somites end inferiorly also in a spine, which is smaller than that of the 1st; there is a strong spine, finally, at each angle of the posterior border of the 6th somite, which is half as long as the somite itself. In the female the postero-inferior angle of the 1st pleuron is obtuse, not spiniform, the lower angle of the 2nd is subacute or even sometimes also obtuse, but those of the 3 following somites terminate inferiorly in a short spine like in the male and the 6th somite is, like in the latter, armed with two strong spines posteriorly. DANA's figure 6*a* represents probably a female without eggs, but it is no doubt inaccurate, for there is no spine at the postero-inferior angle of the 6th somite and the postero-inferior angle of the 1st pleuron appears acute. Telson flattened above, with 3 pairs of small dorso-lateral spinules at subequal distances from one another and two pairs of spinules at the tip. Outer uropods as long as the inner and nearly as long as the telson.

Cornea larger than the rest of the eyestalk, a small black ocellus seems to be present, though entirely surrounded by the cornea.

Antennular peduncle reaching to the middle of the rostrum, 2nd and 3rd joint small, subequal, stylocerite acuminate, reaching almost to the middle of 3rd article or to the distal extremity of 2nd; flagella of equal length, in the male one and a half, in the female just as long as the carapace, without the rostrum, proximal fifth (third) of outer flagellum thickened.

Spine at the outer lower angle of 2nd joint of antennal peduncle reaching to the middle of the eyes, when the stalks are stretched forward, somewhat compressed dorso-ventrally, slightly contorted and acute; peduncle stout, almost as long as that of the upper antennae, flagellum $2^1/_2$-times as long as carapace and rostrum combined. Scaphocerite as long as or a trifle longer than the rostrum, acute tip slightly curved inward; the three teeth on the outer margin gradually increase in size distally, between the teeth and for a short way before the anterior the outer margin appears obtusely crenulate in adult specimens, less distinctly so in younger ones.

Mandibular palp 3-jointed, 2nd joint transversely oval, broader than long and shorter than the 1st and the 3rd, the arched margins setiferous; 3rd joint as long as 1st, twice as long as 2nd, a little more than twice as long as broad, fringed with long setae at the rounded tip and the (inner?) margin. Molar process cylindrical, the truncate, yellow brown coloured tip with 3 or 4 obtuse lobes; distal edge of incisor process 6-dentate, the teeth acute, the four inner of equal size and half as long as the two at the angles.

The 1st maxilla (Fig. 22*g*) has no doubt been damaged by the operation, because there is only one endite; this endite, somewhat longer than broad, is fringed with spines and feathered setae, except on that part of the margin which is situated near the palp; the truncate tip of the palp bears a feathered seta at that angle which is situated opposite the endite. Of the two inner distal lobes (Fig. 22*h*) of the 2nd maxilla, that project considerably beyond the basal lobe, the rounded anterior is one and a half as long as the posterior and the narrow fissure between them does not extend to the inner margin, so that the two lobes coalesce on their internal half. Posterior lobe of scaphognathite rounded.

The endopodite of the 1st maxilliped (Fig. 22*i*, 22*j*) bears a small obtuse lobe at the base at the inner side, like in *Thalass. lucida* (Dana) as figured by Dr. Ortmann (Zoolog. Jahrb. Bd. V, Abth. f. Syst. 1890, Taf. XXXVII, fig. 1*g*); basipodite separated by a suture from the coxopodite, epipodite well developed like in the genus *Pandalus*.

Second maxilliped (Fig. 22*k*) resembling that of *Thalass. lucida*, terminal joint applied as a strip to the end of the 6th, one and a half as broad as long.

The terminal joint of the external maxillipeds that almost extend to the tip of the antennal scale, is 4-times as long as the penultimate and gradually tapers to the tip, while the borders are clothed with spines and setae; the outer margin of the antepenultimate joint is emarginate and runs therefore like a S. The exopodite reaches to the middle of the penultimate joint. The oral appendages, here described, are those of the left side and taken from the adult male collected at Stat. 282.

The peraeopods of the 1st pair reach in the adult male to the middle of the terminal joint of the external maxillipeds. Ischium only $^1/_{11}$ longer than merus, the latter one-fourth broader than ischium, both joints fringed with setae along their inner margin, a few also on the outer. Carpus five-eighths of the merus, with a transverse row of 5 or 6 short spines on the inner half of the distal border that articulates with the propodus, and clothed with long setae on the inner and distal margin, a few also on the outer; terminal joint (propodus) one and a half as long as the carpus, tapering, acuminate and slightly curved, 5-times as long as thick near the base, and armed with spines and setae; a minute chela at the extremity does not exist.

The peraeopods of the 2nd pair reach to the tip of the antennal scale. Ischium 3-times as long as broad; upper border a little curved, convex; lower border straight, though uneven, and bearing in the middle two or three spiniform juxtaposed setae, while both margins show a few prominences, near each of which a short seta is implanted. The merus which is as long as the ischium but a little less broad, has an uncouth shape; the lower border namely is hollowed out and concave, for embracing the carpus and the chela, which the animal uses to bear drawn back like in some species of the genus *Athanas* Leach; the obtuse prominences on both margins are larger than those of the ischium and on each prominence a short seta is implanted. Carpus conical, a little more than half as long as the merus and a little more than one and a half as long as thick; the upper border bears a small obtuse tubercle, tipped with a seta, near the meral articulation, from which it is separated by a notch. The carpus is flattened above. Chela compressed, $2^1/_2$-times as long as the carpus and $2^1/_2$-times as long as broad, fingers half as long as the palm. The immobile finger is armed near the base with a large,

subacute tooth, the margins of which are curved and with a transverse row of setae on either side and which tooth is a little broader than high; this finger bears moreover a lower prominence distally. Dactylus with a rounded tooth in the middle, smaller than the basal tooth of the other finger, and with a lower, also rounded prominence beyond it; terminal claws of the fingers conical, crossing one another. While the fingers bear several tufts of setae, the palm is nearly smooth and glabrous.

The peraeopods of the 3rd pair (Fig. 22*m*, 22*n*, 22*o*) show a remarkable character, which was still unknown, namely the fact that the dactyli have a different form in the male and in the female, a sexual dimorphism therefore. The legs of the 3rd pair reach in the male to the tip of the rostrum; the merus is about one and a half as long as the ischium, 6-times as long as broad and armed on the distal half of its lower border with three conical, stout and subequal teeth, the first in the middle of the margin, the 3rd, near the carpal articulation, one and a half as far from the 2nd as the 2nd from the first, upper margin of ischium and merus fringed with feathered setae, shorter setae occur also on the lower margin; carpus 3-times as long as thick distally, almost half as long as the merus, with a strong spine at the distal extremity and a similar one on the middle of the lower margin, here and there moreover setiferous; propodus twice as long as the carpus, a little shorter than the merus, nearly 10-times as long as broad in the middle, both margins armed with spines and setae, while three longer spines occur at the far end; dactylus half as long as the propodus, flattened, compressed, 5-times as long as broad, slightly curved towards the acute tip and narrowing only from about the middle; the upper margin is armed with 6 spines at subequal distances and these spines are about half as long as the dactylus is wide or a little longer, lower margin with 17 or 18 closely-set spines, that are half as long as those of the upper margin. The 3rd legs of the ova-bearing female from Stat. 282 agree, excepting the dactylus, with those of the male, but the merus is 5-times and the propodus 8-times as long as broad, a difference owing no doubt to the somewhat smaller size of this specimen; the dactylus, like in the male nearly half as long as the propodus, has a more slender form, being 6 or 7-times as long as broad and, otherwise than in the male, gradually narrows from the base to the tip; the terminal claw (stylopodite) is comparatively longer, measuring $^1/_4$—$^1/_3$ the whole length of the dactylus (in the male $^1/_8$), the posterior margin has only six spinules that gradually increase in length from the 1st or proximal to the last, like is also the case with the interspaces between them, and there are but three spines on the anterior border, that increase in length from the 1st at the proximal fourth to the 3rd on the middle of the margin, which is 3-times as long as the 1st.

The legs of the 4th pair much resemble those of the 3rd, both in the male and in the female. The dactyli, however, of the 4th legs of the male, 4,5-times as long as broad, more gradually narrow from near the base to the extremity, there are only 3 spines on the anterior margin, like in those of the female, the terminal claw is longer, nearly one-fourth the whole length and there are only 9 spinules on the posterior margin, that are not so close-set as in the 3rd leg and that slightly increase in length. The dactyli of the 4th pair of the female resemble those of the 3rd.

The merus of the 5th legs of the male is almost twice as long as the ischium and 5-times as long as broad in the middle; the lower margin is armed with 4 spines that are much smaller than those of the 3rd and 4th pair, and implanted along the whole length of the margin, while the lower border of ischium and merus is fringed with long feathered setae. Carpus about half as long as the merus, a little more than 3-times as long as thick, with a comparatively small spine at the far end of the posterior margin, but with no spine on the middle, propodus a little longer than merus, twice as long as the carpus and about 7-times as long as broad; dactylus measuring one-third the length of the propodus, 5-times as long as broad, gradually narrowing, no spinules on the upper margin but with 5 on the lower or posterior, that gradually increase in length like the interspaces between them, terminal claw measuring one-fourth the whole length of the dactylus. Fifth leg of the female resembling that of the male.

Ova comparatively large, 0,7—0,74 mm. long, 0,44 mm. broad and not very numerous.

The adult male from Stat. 138 is 18 mm. long from tip of rostrum to tip of telson, the abdominal pleura are armed with spines like in the preceding specimens and the 2nd pleopod bears a stylamblys and an appendix masculina; in the two young specimens that are of equal size, 10 mm. long, the pleopod of the 2nd pair has only one appendage, the stylamblys, but they are considered as males, because the abdominal pleura resemble those of the adult male. The rostrum of the adult male is $\frac{10}{3}$-dentate, of the upper teeth two stand on the carapace, the 3rd immediately before the orbital margin, the teeth increase distinctly in size from the 1st to the last and the latter is a little farther distant from the tip than from the penultimate. Teeth of the lower margin like in the preceding specimens. The rostral dilatation appears as long in proportion to the rest of the rostrum as in Dana's figure 6*b*, but the dilatation is anteriorly only 1,1 mm. broad, less broad than in the other adult specimens, posteriorly, however, 0,9 mm., so that the straight, not concave, lateral margins converge less strongly than in Dana's figure.

The spine of the 3rd tergum reaches not yet to the middle of the 4th.

Terminal joint of external maxillipeds only 3-times as long as the penultimate. In the peraeopods of the 1st pair the merus is still a trifle longer than the ischium, the carpus measures $\frac{11}{15}$ of the merus and the terminal joint is but one-fourth longer than the carpus. The legs of the 2nd pair resemble those of the adult female from Stat. 99 (Fig. 22*l*). Those of the 3rd and 4th pair also agree with the male from Stat. 282, the merus of these legs is, however, armed with four teeth, the dactylus of the 3rd pair has only 4 spines on the upper and 14 on the lower margin besides the terminal claw; the dactylus of the 4th pair, 6-times as long as broad at base, bears only 2 spines on the upper and 9 on the lower margin besides the terminal claw. The merus of the 5th leg bears 3 spines on the lower margin, 2 on the proximal half and one near the distal extremity. Dactylus of last pair 5-times as long as broad, with 7 spines on the lower margin besides the terminal claw.

In the two young individuals the rostrum is not yet laterally dilated and the legs show also some slight differences from the adult species: ischium and merus of the 2nd pair are still devoid of spines and prominences and the dactyli of the following legs show a more slender form.

The full-grown male is 22,5 mm. long, (rostrum 4,6 mm., carapace 5,5 mm., abdomen 12,4 mm.), the female has the same size.

General distribution: Western Indian Ocean (Borradaile); Sulu Sea (Dana); Dzushi, Japan (Balss).

1*a*. *Thalassocaris crinita* (Dana) var.? Pl. X, Fig. 23—23*c*.

Stat. 213. Sept. 26—Oct. 26. Saleyer-anchorage and Surroundings, including Pulu Pasi Tanette, near the North point of Saleyer-island. Up to 36 m. Bottom coralreefs, mud and mud with sand. 3 males.

These specimens bear such a close resemblance to those of *Thalass. crinita* (Dana), described above, that they are provisionally regarded as a variety.

The largest specimen is about 18 mm. long (rostrum 3,6 mm., carapace 4,1 mm., abdomen 10,5 mm.). Rostrum in a lateral view as in the typical form, but only 7 teeth dorsally, 2 of which, however, stand also on the carapace, and there is also a small tubercle at the base of the 1st tooth; lower margin with 3 teeth, the 3rd placed just in front of the anterior tooth of the upper. The upper margin runs downward as far as the anterior tooth, the distal remaining part horizontal. When the carapace, however, is looked at from above, the basal dilatation of the lateral carinae appears much smaller, only 1 mm. broad, in the typical male from Stat. 93, however, which has the same size, the dilatation appears one and a half as broad, namely 1,5 mm.; the lateral margins converge also less strongly backward than in the typical specimen, for in the latter the width at the base of the dilatation is 1,12 mm., in the male from Stat. 213, however, 0,86 mm. The second specimen agrees with the described one, in the third the rostrum is broken off. For the rest carapace and abdomen fully resemble those of the typical species and even the transverse wrinkles below the supra-orbital spine are distinct.

The other differences are the following. While the ischium of the 2nd legs agrees with that of the typical form, the merus does not show the obtuse prominences on its margins and the upper border appears quite straight and misses even the short spiniform setae, which in the typical species stand on the prominences. The carpus is more narrowed proximally and the obtuse tubercle is absent, like also the notch behind it. Though the measurements of the legs of the 3rd pair are typical, the dactyli more resemble those of the female. The dactyli, indeed, here also half as long as the propodi, are about 7-times as long as broad, narrow gradually and end in a stylopodite that measures $^1/_6$ the whole length of the joint; the upper margin has no spines, along the posterior 10 spinules occur at subequal distances and the spinules slightly increase in length. Dactyli of the following legs like those of the 3rd pair, those of the 5th pair with 7 spinules on the posterior margin.

Family Pandalidae.

The family *Pandalidae*, nowadays represented by a hundred species and a few varieties, includes the following eleven genera: *Pandalus* Leach, *Dichelopandalus* Caull., *Pandalina*

Calman, *Peripandalus* de Man, *Pandalopsis* (A. M.-Edw.) Bate, *Pantomus* A. M.-Edw., *Plesionika* Bate, *Parapandalus* Borr., *Heterocarpus* A. M.-Edw., *Dorodotes* Bate, *Chlorotocella* Balss and *Chlorotocus* A. M.-Edw. The species of the genus *Pandalus* Leach, about 20 in number, though some may prove to be synonyms, are found either north of the tropic of Cancer or south of the tropic of Capricorn and have not yet been observed between the tropics. The majority of the species of this genus are found in the North Atlantic and in the North Pacific, but do not occur in the Mediterranean, while only four are known from the southern hemisphere. The genus *Dichelopandalus* Caull., which is closely related, includes two species, one in the eastern, the other in the western half of the North Atlantic, the latter, however, has also been observed off Shumagin Bank, Alaska. The only species of *Pandalina* Calman ranges, in the northeast Atlantic, from the Barents Sea to the Mediterranean. The genus *Peripandalus* de Man is also represented only by one species, *Perip. serratus* (A. M.-Edw.) from Upolu, Samoa Islands. The six or seven representatives of the genus *Pandalopsis* (A. M.-Edw.) Bate, that differs from the other genera by the conspicuous laminar expansion at the inner border of the ischium of the 1st pair of legs, are all distributed throughout the North Pacific either on the east or on the west side, except only *Pandalopsis ampla* Bate, which was taken by the "Challenger" off Monte Video, but afterwards proved to range also from Washington to Mexico on the west coast of North America. *Pantomus parvulus* A. M.-Edw. is the only representative of a genus, which is characterized, like the genus *Rhynchocinetes* H. M.-Edw., by the rostrum being movably articulated with the carapace: this rare Crustacean is still only known from off the south coast of the United States. Except probably this remarkable genus *Pantomus* and except the genus *Peripandalus*, the preceding genera do not occur between the tropics, the six remaining, however, are all represented in the tropical seas. It appears superfluous to expatiate on the distribution of these genera, that are all represented in this collection, because in the general introduction to each genus the geographical range of their species will be fully elucidated.

Very interesting are the catches made by the "Siboga" in this family, not only on account of the discovery of three new species and two new varieties, all remarkable, but also on account of the great number of specimens of some species, so that our knowledge of this family has considerably increased. As the result of the investigations chiefly of the "Challenger" and of the "Siboga", we know at present that the Indian Archipelago is inhabited by 10 species and 1 variety of *Heterocarpus* A. M.-Edw., by 10 (or probably 12) species and 2 varieties of *Plesionika* Bate, by 2 or 3 species of *Parapandalus* Borr. and by one species of each of the three genera *Dorodotes* Bate, *Chlorotocella* Balss and *Chlorotocus* A. M.-Edw.

Key to the genera of Pandalidae.

a_1 Carpus of 2nd pair of thoracic legs multiarticulate, the number of articulations more than three.

b_1 Excepting a postrostral crest the carapace is smooth.

c_1 Rostrum immovable.

d_1 Eyes large, much wider than the eyestalk.

e_1 External maxillipeds with exopodite.

f_1 Posterior lobe of scaphognathite acutely produced.
Stylocerite broad and rounded. Epipodite wanting from the last leg only. Rostrum armed dorsally with movable spines only . . . . . **Dichelopandalus** Caull.

f_2 Posterior lobe of scaphognathite broadly rounded or truncate.
Stylocerite pointed. Rostrum armed dorsally with fixed teeth and sometimes with movable teeth also.

g_1 All the thoracic legs, except the last pair, with an epipodite . . . . . **Plesionika** Bate

g_2 Epipodites absent from all the thoracic legs . . . **Parapandalus** Borr.

e_2 External maxillipeds without exopodite.
Stylocerite broad and rounded.

f_1 Laminar expansion of the inner border of the ischium of 1st pair of legs very large.
Antennular flagella very long. Rostrum armed dorsally with movable spines only . . . . . **Pandalopsis** (A. M.-Edw.) Bate

f_2 Laminar expansion of the inner border of the ischium of 1st pair of legs wanting or inconspicuous.

g_1 Except the last pair there are epipodites on all the thoracic legs.

h_1 Posterior lobe of scaphognathite truncate.
Upper margin of rostrum armed with fixed teeth as well as with movable spinules . . . . . **Pandalina** Calman

h_2 Posterior lobe of scaphognathite acutely produced.
Dorsal crest and upper margin of rostrum armed with movable spinules only . . . . . **Pandalus** Leach.

g_2 No epipodites on the thoracic legs.
Stylocerite rather pointed, though rounded at the tip.
Upper margin of rostrum armed with fixed teeth only **Peripandalus** de Man

d_2 Eyes very small, narrower than the eyestalk . . . . **Dorodotes** Bate

c_2 Rostrum movably articulated with the carapace . . . **Pantomus** A. M.-Edw.

b_2 Carapace with longitudinal carinae, in addition to the postrostral crest: integument very hard and rigid.

c_1 Legs of the 2nd pair very unequal. . . . . **Heterocarpus** A. M.-Edw.

c_2 Legs of the 2nd pair equal, 6-jointed . . . . . **Heterocarpoides** de Man.

a_2 Carpus of 2nd legs triarticulate.
Carapace armed, besides with the antennal and the branchiostegal, also with a supra-orbital spine. . . . . **Chlorotocella** Balss

a_3 Carpus of 2nd legs biarticulate.
No supra-orbital spine on the carapace . . . . . **Chlorotocus** A. M.-Edw.

LIST OF ALL THE SPECIES OF PANDALIDAE, KNOWN AT PRESENT.

Pandalus Leach 1814.

SPECIES	HABITAT	DEPTH IN FATHOMS
borealis Kröyer 1838	Circumpolar. In Europe from 81° 14′ N.L. southward to Northumberland, Skagerrak and Kattegat	50—260
	Kara Sea	49, 100
	On the atlantic coast of North America from Greenland and north of Iceland southward to Massachusetts Bay	40—495
	Bering Sea and North Pacific, southward on the american coast, to Columbia River	29½—350
	Okhotsk Sea	
Danae Stimps. 1857 [1]	From Sitka, Alaska to San Francisco, California	10—97
goniurus Stimps. 1860 [2]	From the Arctic coast of Alaska southward to Okhotsk Sea on one side and Puget Sound on the other	3—100
gracilis Stimps. 1860 [3]	Bay of Hakodate, Japan	
	Korean Straits	
Gurneyi Stimps. 1871 [4]	Southern California	[illegible]
hypsinotus J. F. Brandt 1851	From Bering Sea to Strait of Fuca and Kurile Islands, as far as Nemuro	3—20
hypsinotus J. F. Brandt 1851 var. *meridionalis* Balss 1914 [3]	From Nagasaki to Nemuro and Wladiwostok	To a depth of 60
Jordani Rathb. 1902	From Unalaska to southern Calfornia	35—178
Kessleri Czern. 1878 [6]	Japan	
leptorhynchus Stimps. 1860	Port Jackson	Littoral
magnoculus Bate 1888	Near New Zealand	150, 275
modestus Bate 1888	Agulhas Bank off the Cape of Good Hope	150
Montagui Leach 1814	White Sea, Murman Sea	
	From the extreme north of Norway to the English Channel: the whole of the North Sea, Skagerrak, Kattegat and most western part of the Baltic, Rockall	10—160
	Baffin Bay	35
	Round the coasts of Iceland	44—117
	East coast of North America as far south as lat. 41° 25′ N.	10—90

1) With this species *Pandalus franciscorum* Kingsley 1878 is identical.

2) With this species *Pand. dapifer* Murdoch 1884, which was dredged in abundance off Point Franklin, north coast of Alaska, in 13½ fathoms, is identical.

3) This species is regarded by Dr. BALSS as identical with *Pand. platyceros* Brandt.

4) According to Miss RATHBUN (Decap. Crust. Northwest coast of N. America, 1904, p. 50), this species that has rather insamiciently. been described by STIMPSON, must be referred to the genus *Pandalus* Leach.

5) With this variety *Pandalus robustus* Stimps. is regarded by Dr. BALSS as identical.

6) With this species *Pandalus latirostris* Rathb. (Japanese Stalk-eyed Crustaceans 1902) seems to be identical.

SPECIES	HABITAT	DEPTH IN FATHOMS
Montagui tridens Rathb. 1902	From Bering Sea to Point Arena, California	3—351
paucidens Miers 1881	Tom Bay (Chili)	
	Trinidad Channel (Chili)	30
	Calbuco, Cavancha (Chili)	
	Near Rio de Janeiro	Surface
platyceros J. F. Brandt 1851 [1]	Unalaschka	
prensor Stimps. 1860 [2]	Gulf of Hakodate	8
propinquus G. O. Sars 1869	West coast of Norway, north to Malangen	80—300
	West coast of Scotland	40
	North Channel between Ireland and Scotland	110—130
	Irish Sea	34—42
	North side of Bay of Biscay	240—444
	West of the Faeroes	720, 950
	West and south of Iceland	170—1089
	Davis Straits	318—582
	East coast of the United States between Boston and the Capes of the Delaware	116—640
pubescentulus Dana 1852 [3]	Strait off Fuca, off Dungeness	
robustus Stimps. 1860 [4]	Gulf of Hakodate	Deep water
stenolepis Rathb. 1902	From the Aleutian Islands to Oregon	27—125
Stimpsoni Thallwitz 1891 [5]	Japan or China	

Pandalina Calman 1899.

brevirostris (Rathke) 1843	Barents Sea, 74° 16′ N., 29° 47′ E.	192
	North-east Atlantic from West Finmark to the Mediterranean, but unknown from Iceland	Littoral to 584

Peripandalus de Man 1917 [6].

serratus (A. M.-Edw.) 1874	Upolu	

Pandalopsis (A. M.-Edw.) Bate 1888.

aleutica Rathb. 1902	Aleutian Islands	270, 283
ampla Bate 1888	Off Monte Video	600
	From Washington to Mexico	623—984

1) With this species *Pandalus pubescentulus* Dana is regarded as identical by Miss RATHBUN 1904. — *Pand. platyceros* J. F. Brandt, has, however, erroneously been identified by BALSS (Ostasiat. Decap. II 1914, p. 28) with *Pand. Kessleri* Czern. = *latirostris* Rathb., for it differs at first sight by the lower margin of the rostrum being only armed with five teeth and by the antennal scale being distinctly shorter than the carapace.

2) This species is no doubt different from *Pand. Kessleri* Czern. = *latirostris* Rathb. *Pand. prensor* Stimps. indeed is at once distinguished by the longer external maxillipeds that almost reach to the apex of the scaphocerite, in *Pand. Kessleri*, however, only to the middle, and furthermore by the subprehensile legs of the 3rd pair.

3) This species is perhaps identical with *Pandalus platyceros* J. F. Brandt.

4) Probably identical with the variety *meridionalis* Balss of *Pand. hypsinotus* J. F. Brandt.

5) This species is probably identical with *Pand. hypsinotus* J. F. Brandt.

6) This genus has been established in: Zoolog. Mededeelingen, uitgegeven vanwege 's Rijks Museum van Natuurlijke Historie te Leiden. Deel III, Afl. 4, 1917, p. 281.

SPECIES	HABITAT	DEPTH IN FATHOMS
dispar Rathb. 1902	From Bering Sea to Washington	53—351
dispar Rathb. var. *japonica* Balss 1914	Etschiu, Japan	
lamelligera (J. F. Brandt) 1851	Okhotsk Sea	
	Petropavlovsk, Kamchatka	
	Gulf of Sachalin, Ulban Bay, Uda Bay	
longirostris Rathb. 1902	Off Iliuliuk Harbor, Unalaska	309
Mitsukurii Rathb. 1902	Mororan, Hokkaido	
pacifica (Doflein) 1902 [1]	Nemuro, Island of Yesso	

Dichelopandalus Caull. 1896.

Bonnieri Caull. 1896	South of Iceland	114—173, 137—207
	South and west Norway to lat. 67° 20′ N.	60—423
	Off Rockall	120
	Off the west coast of Scotland, Loch Fyne, Loch Long	40—105
	Irish Sea	20—80
	Off the west and south-west coast of Ireland	214
	Bay of Biscay	98, 218, 655
leptocerus S. I. Smith 1881 [2]	East coast of the United States from Nova Scotia to Cape Hatteras	15—430
	Off Shumagin Bank, Alaska	138

Plesionika Bate 1888

(With this genus the genus *Nothocaris* Bate is united).

acanthonotus (S. I. Smith) 1882	East coast of the United States	233
Alcocki (A. R. S. Anderson) 1896	Arabian Sea	360, 406, 597
	Bay of Bengal	561
	Andaman Sea	271, 405, 490, 500
assimilis de Man 1917	Molo-Strait, west coast of Flores	30—50
bifurca Alcock & Anderson 1894	Arabian Sea	636
	Bay of Bengal	[illegible]
	Andaman Sea	[illegible]
	Bali Sea	[illegible]
	North of Sumbawa	[illegible]
	Ceram Sea	[illegible]
	West of Saleyer	[illegible]
	Kei-islands	[illegible]
binoculus (Bate) 1888	Arafura Sea	[illegible]
	Strait between Rotti and Timor	[illegible]
	Strait between Flores and Solor	[illegible]
brevirostris Bate 1888	Between the Philippine Islands and Borneo	[illegible]
brevis (Rathb.) 1906	Vicinity of Kauai Island	[illegible]
	Vicinity of Niihau Island	[illegible]

1) This species is closely related to *Pandalopsis Mitsukurii* Rathb.

2) With this species *Pandalus falcipes* Bate 1888 is identical.

SPECIES	HABITAT	DEPTH IN FATHOMS
capreensis Lo Bianco 1903	Near Capri	1260
ensis (A. M.-Edw.) 1881	Off Barbados Island	237
	Off Martinique	213
	Off Grenada	159
	Andaman Sea	185
	Hawaiian Islands	55—684
exigua (Rathb.) 1906	Vicinity of Kauai	233—40
	Northeast coast of Hawaii	63—113
geniculata (A. M.-Edw.) 1883	Expedition of the "Travailleur" in 1882	738
	Off Creta	240
	Off Barra Grande, Brazil	350
gracilis Borr. 1915	Western Indian Ocean	200
Gigliolii (Senna) 1903	Off Sardinia	280
heterocarpus (A. Costa) 1871 [1]	North and east coast of Sardinia	92—215
	Gulf of Naples	
	West of Sicilia	218
	Off the coast of Tripolis	
	Cyclades	160—371
hypanodon Dofl. 1902	Sagami Bay, Japan	
	Enoshima, Japan	43
longipes (A. M.-Edw.) 1881	Near Barbados, Antilles	204
longipes (A. M.-Edw.) var. *indica* de Man 1917	Near the Kei-islands	170
longirostris (Borr.) 1899	New Britain	
	Cape Natal	185
martia (A. M.-Edw.) 1883	East Atlantic	218—655
	West and Southwest of Ireland	221—627
	Gulf of Gascony	218—273
	Spanish coast	
	South of Sardinia	277—359
	West of Sicilia	450—415
	Messina	
	South of Creta, Cyclades	291—480
	Lion's Head, South Africa	131—136
	Arabian Sea	142—400, 430
	Bay of Bengal	224—284
	Andaman Sea	194, 188—220, 271, 405
	Tasman Sea	800
	Hawaiian Islands	165—684
	Sagami Bay, Japan	437
martia (A. M.-Edw.) var. *semilaevis* Bate 1888	Between the Philippine Islands and Borneo	250
	Bali Sea	158, 285, 294
	Off Makassar	246
	Sulu Sea	246
	Between Ceram and New Guinea	310

1) According to TH. ADENSAMER in: Denkschr. Kais. Akad. Wiss. Wien, Bd. LXV, 1898, p. 624, *Pandalus sagittarius* A. M.-Edw. 1883 and *Pandalus longicarpus* A. M.-Edw. 1883 (Recueil Crust. Nouv. Pl. 23 and 25) should be identical with this species.

SPECIES	HABITAT	DEPTH IN FATHOMS
	Kei-islands	306
	Off the island of Rotti	284
	Lobetobi Strait	135
	North coast of Sumbawa	150
	Off Matuku, Fiji Islands	315
	Off the Kermadec Islands	520
	Off Sydney Harbour	1200 [1])
ocellus (Bate) 1888	Near Samboangan, Philippine Islands	82
	Andaman Sea	173 [2])
	Hawaiian Islands	45—230 [2])
ocellus (Bate) var. *subtilirostris* Riggio 1906	Mediterranean	
Ortmanni Dofl. 1902	South coast of Japan	27—164
	Bali Sea	55
Parfaiti (A. M.-Edw.) 1883 [3])	Expedition of the "Travailleur" in 1882	738
quadridentata (A. M.-Edw.) 1883 [3])	Expedition of the "Travailleur" in 1882	218
rostricrescentis (Bate) 1888	Off the Kei Islands	140
Sindoi (Rathb.) 1906	Hawaiian Islands	235—228, 347—264, 64—60
	Sulu Sea	150
	West of Kei-islands	166
spinidorsalis (Rathb.) 1906	Hawaiian Islands	55—684
spiniserrata (Bate) 1888	Port Otway, Messier Channel	45
tenuipes (S. I. Smith) 1881	Off the south coast of New England	100—252
tenuipes (A. M.-Edw.) 1883 [3])	Newport	142
unidens Bate 1888	North of New Guinea	150
	Bali Sea	158
	West of Kei-islands	166
	Andaman Sea	172—303
uniproducta Bate 1888	Off Barra Grande, Brazil	350

Parapandalus Borr. 1899.

Adensameri Balss 1914	Red Sea	440—715
Cottei [Pfeffer] (Kotte) 1903	Off the Suaheli coast (German East Africa)	345
escatilis (Stimps.) 1860	Off Madeira	
longicauda (Rathb.) 1901	Porto Rico	220—225
	Gulf of Mexico	88
miles A. M.-Edw. 1883	Martinique	200
Narwal (Heller) 1863 [4])	Mediterranean	87, 371

1) This locality and depth are doubtful: SPENCE BATE, indeed, (Report Challenger Macrura, p. 644) says that two specimens were collected off Sydney Harbour, at a depth of 1200, associated with *Nothocaris rostricrescentis*; the latter species, however, was captured off the Kei-islands, at 140 fathoms, in one specimen only (p. 654).

2) These two localities are doubtful. The species from the Andaman Sea, described by ALCOCK as *Plesion. ocellus*, should probably be referred to *Plesion. Sindoi* Rathb. and the species from the Hawaiian Islands, described under the same name by Miss RATHBUN, seems also to belong to another form.

3) It is doubtful whether these three species must be referred to this genus or to another, because nothing is known about the epipodites of the thoracic legs.

4) The *Pandalus narwal* of H. MILNE-EDWARDS (Hist. Nat. Crust. T. II. 1837, p. 385) is not this species, but identical with *P. pristis* (Risso), because the rostrum is said to be "finement dentelé en dessus dans toute sa longueur" and because the legs of the 1st pair are described as much longer than the antennal scale, which is not the case in *P. Narwal*, as described by HELLER.

SPECIES	HABITAT	DEPTH IN FATHOMS
pristis (Risso) 1816	Mediterranean	0—110
	Adriatic	
	Red Sea	186—500
Richardi (Cout.) 1905	West of Madeira	
serratifrons Borr. 1899 [1])	New Britain	50—100
	Lobetobi Strait	135
	North coast of Sumbawa	150
spinipes (Bate) 1888	Off Cape Comorin	143
	West of Kei-islands	111
	Near the Kermadec Islands	
	North of New Guinea	150
	Kagoshima, Japan	
	Sagami Bay, Japan	60—164
stylopus (A. M.-Edw.) 1883	Expedition of the "Travailleur" in 1882	290
Zur Strasseni Balss 1914	East of Seychelles	0—1093
	Southwest of Sumatra	0—1310
	Manipa-strait	From 840 to surface
	Midway between the islands of Celebes and Buru	
	South of Ambon	From a depth of 1093 to surface
	West of Banda Island	From a depth of 546 to surface
Dorodotes Bate 1888.		
reflexus Bate 1888	Near Banda Island	1425
	Banda Sea	1530
	Philippine Islands	1050
	Bay of Bengal	1300, 1310, 1439, 1644
Pantomus A. M.-Edw. 1883.		
parvulus A. M.-Edw. 1883	Gulf of Mexico, in: Lat. 28° 13′ N., long. 89° 10′ W.	34
Heterocarpus A. M.-Edw. 1881.		
affinis Faxon 1893	Off Acapulco	660
	Near Las Tres Marias	676—680
affinis Borr. 1915	Saya de Malha	300—500
Alexandri A. M.-Edw. 1883	Havannah	805
	Off Martinique	1030
	Hawaiian Islands	811—671
Alphonsi Bate 1888	South of the Philippines	500
	Off Japan	345
	Arabian Sea	480—740
	Bay of Bengal	753, 561
	Andaman Sea	490, 500
	Cape Natal	440

1) With this species *Parap. tenuipes* Borr. from New Britain and from the D'Entrecasteaux Group, British New Guinea, is considered to be identical.

SPECIES	HABITAT	DEPTH IN FATHOMS
carinatus (S. I. Smith) 1882 [1]	East coast of the United States	178
dorsalis Bate 1888	Bali Sea	284, 294, 380
	Flores Sea	434
	East of Rotti	284, 500
	Strait of Makassar	395
	North of Menado	691—637
	Off Banda Island	200
	Ceram Sea	455
	Entrance of Gulf of Boni	633
	Kei-islands	538
ensifer A. M.-Edw. 1881	Off Barbados Island	218
	Off St. Kitts, Antilles	245
	Off Montserrat	303
	Off Grenada	159
	Between the Philippine Islands and Borneo	250
	New Britain	100
	Hawaiian Islands	31—400
	Sagami Bay, Japan	218—328
ensifer A. M.-Edw. var. *parvispina* de Man 1917	Bali Sea	284
	North of Sulu Island	150
	Off the Kei-islands	170
gibbosus Bate 1888	Off Tablas Island	700
	Bali Sea	158, 285
	Southern entrance of the Strait of Makassar	245
	Near the Kei-islands	217, 305
	Andaman Sea	185, 188–220, 194, 198
	Bay of Bengal	145—250, 240
	Arabian Sea	224—284
Grimaldii A. M.-Edw. & Bouvier 1900	Azores	710
hostilis Faxon 1893	Gulf of Panama	695—1020
laevigatus Bate 1888	Hawaiian Islands	165—632
	Off Banda Island	200
	Flores Sea	273
	Arabian Sea	430, 457—589
	East London, Cape Colony	408
laevis A. M.-Edw. 1883	Martinique	100
	Off Cayman Brac Island, South of Cuba	207
lepidus de Man 1917	Flores Sea	273
	Kei-islands	305
longirostris Mac Gilchrist 1905	Bay of Bengal	600
oryx A. M.-Edw. 1881	Gulf of Mexico	955
signatus Rathb. 1906	Hawaiian Islands	382—253
Sibogae de Man 1917	Bali Sea	158, 284, 294
	Southern entrance of the Strait of Makassar	245
	North of Batjan	217
	West of Saleyer	252
	Kei-islands	217, 305
	Andaman Sea	185—220

1) According to ALCOCK in: Descript. Catal. Indian Deep-Sea Crust. 1901, p. 107 and A. MILNE-EDWARDS in: Recueil Crust. Nouv. 1883, Plate 27, perhaps identical with *Hetcroc. ensifer* A. M.-Edw.

SPECIES	HABITAT	DEPTH IN FATHOMS
tricarinatus Alcock & Anderson 1894. .	East London, Cape Colony	310
	Arabian Sea	865—890
	South of Muna Island	1030
	Entrance of the Gulf of Boni	633
unicarinatus Borr. 1915	Providence Island	637—665
vicarius Faxon 1893	Gulf of Panama	210—286
Wood-Masoni Alcock 1901	Andaman Sea	265
	Madura Strait	180
	Bali Sea	158
	Off Makassar	245
	Near the Kei-islands	170, 217
Heterocarpoides de Man 1917.		
levicarina (Bate) 1888	Arafura Sea, near Torres Strait	28
	Between the islands of Misool and Salawatti	17
	Lobetobi Strait	135
	Saleh-Bay	150
	Bay of Bima	7—17
	Gulf of Martaban	
	Southern part of the Red Sea	116
Chlorotocella Balss 1914.		
gracilis Balss 1914	Sagami Bay	27
	Dzushi, Japan	43—71
	Enoshima	43
	Between Misool and Salawatti	17
	Batjulmati (Java)	Reef
Chlorotocus A. M.-Edw. 1882.		
crassicornis (A. Costa) 1871.	Cyclades, Sporades	226, 326
	Adriatic	87
	Gulf of Naples	
	Off the Ligurian coast	
	Mediterranean [1])	181—202
	Cape Point, South Africa	80
	Cape Natal	185
crassicornis (A. Costa) var. *andamanensis* Anderson 1899.	Andaman Sea	185
incertus Bate 1888	Agulhas Bank, off the Cape of Good Hope	150
	Sagami Bay, Japan [2])	
Novae-Zealandiae (Borr.) 1916.	Off North Cape, New Zealand	70
spinicauda de Man 1902	Ternate	
	Madura-bay and other localities in the southern part of Molo-strait	30—50
	Between the islands of Wowoni and Buton	41—51

1) This species was dredged by the "Travailleur", 27 July 1881, in 181—202 fathoms: this took probably place in the Mediterranean and not in the Gulf of Gascony, as suggested by SPENCE BATE (Challenger Macrura, p. 674), because the "Travailleur" has worked in July 1881 in the Mediterranean (A. MILNE-EDWARDS, C. R. Acad. Scienc. Paris, T. 93, 1881, p. 931) and was fishing in the Gulf of Gascony only three weeks later, August 17th.

2) A specimen from this locality was referred by Dr. BALSS with some doubt to this species.

Plesionika Bate.

The genus *Plesionika* Bate, with which the genus *Nothocaris* Bate is united and which contains at present nearly 30 species [1]) and 3 varieties, is represented in the "Siboga" collections by eight species, of which only three were already known to occur in the Indian Archipelago: *Ples. martia* (A. M.-Edw.) var. *semilaevis* Bate, *unidens* Bate and *binoculus* Bate. The catch made by the "Siboga" proved to be very interesting. The two largest representatives of this genus are *Ples. martia* (A. M.-Edw.) and *Ples. longipes* (A. M.-Edw.), which both attain a length of 190 mm. Of the former the variety *semilaevis*, described by Spence Bate as a proper species, was collected at ten different Stations in no less than 400 specimens, of the latter, *Ples. longipes* (A. M.-Edw.), a form discovered by the "Blake" in 1881 in the West-Indies but since that year never taken again, no less than nine well-preserved adult specimens were captured near the Kei-islands, which, however, seem to belong to a distinct variety. The five specimens of *Ples. binoculus* (Bate), collected by this expedition, are full-grown, twice as large as those that were taken by the "Challenger"; one of the eight species, finally, proved to be new to science.

Five species are found in the Mediterranean besides a variety *subtilirostris* Riggio of the indian *Ples. ocellus* (Bate). *Ples. capreensis* Lo Bianco, the smallest species of this genus excepting *Ples. spiniserrata* (Bate), occurs off the island of Capri, the four others are *Ples. heterocarpus* (A. Costa) and *Gigliolii* (Senna), that are both confined to the Mediterranean, furthermore *Ples. martia* (A. M.-Edw.) and *geniculata* (A. M.-Edw.), that are more widely distributed. *Ples. martia*, indeed, occurs also in the east Atlantic, west and southwest of Ireland, in the Gulf of Gascony and along the spanish coast, but it has also been observed of Lion's Head, South Africa, in the Arabian Sea, the Bay of Bengal, the Andaman Sea, in Sagami Bay, Japan, near the Hawaiian Islands and even in the Tasman Sea! Though this species proves thus to be very widely distributed, its range is not cosmopolitan, for it is not yet known from the western Atlantic nor from the west coast of the New World. *Ples. geniculata* (A. M.-Edw.) was taken by the "Travailleur", July 19th 1882, but a list of the Stations of this expedition has never been published as far as I know; this species was afterwards obtained by the "Challenger" off Pernambuco, Brazil. Besides this species also *Ples. Parfaiti* (A. M.-Edw.) and *Ples. quadridentata* (A. M.-Edw.) were discovered by the "Travailleur".

Ples. ensis (A. M.-Edw.) occurs in the West-Indies off the islands of Barbados, Martinique and Grenada, but has also been observed in the Andaman Sea and even near the Hawaiian Islands, being almost as widely distributed as *Ples. martia*. *Ples. acanthonotus* (S. I. Smith) and *Ples. tenuipes* (S. I. Smith) represent this genus on the east coast of the United States, both are species of rather small size. In a rare work published by A. Milne-Edwards in 1883, entitled: "Recueil de Figures de Crustacés nouveaux on peu connus", a *Pandalus tenuipes*

1) Including two species, *Pandalus quadridentatus* A. M.-Edw. and *Pand. Parfaiti* A. M.-Edw., obtained by the "Travailleur" in the summer of 1882, and *Pand. tenuipes* A. M.-Edw., of which it is doubtful whether they belong to this genus or to another, because it is not known whether they have epipods on the thoracic legs or not, while *Pand. tenuipes* A. M.-Edw. (Recueil de Figures de Crust. Nouv. 1883, pl. 24) seems to differ from Smith's *tenuipes*, which is a true *Plesionika*. Of *Pand. exiguus* Rathb. and *Pand. spinidorsalis* Rathb. it is likewise still unknown whether they bear epipods or not, but these forms no doubt belong to *Plesionika*, because *Ples. rostricrescentis* (Bate) and *Ples. bifurca* Alcock & Anderson are said to be respectively the nearest related species.

from Newport was figured on Plate 24, which seems to differ from S. I. Smith's *tenuipes* by the different toothing of the upper margin of the rostrum. The second form, known from the coast of Brazil, is *Ples. uniproducta* Bate: the western Atlantic proves thus to be inhabited only by 5 or 6 species. *Ples. spiniserrata* (Bate) is the only form recorded from the coast of South Chili: excepting this species no representatives of this genus are known to occur on the west coast of America.

The majority of the species, however, are found in the Indopacific. Besides the variety *semilaevis* of the widely distributed *Ples. martia* (A. M.-Edw.) and the new variety *indica* of the west-indian *Ples. longipes* (A. M.-Edw.), already mentioned above, nine species are at present known to occur in the Indian Archipelago. *Ples. brevirostris* Bate is still only known from between the Philippine Islands and Borneo, *Ples. Ortmanni* Dofl., first recorded from Japan, was captured by the "Siboga" in the Bali Sea, *Ples. Sindoi* (Rathb.) was taken in the Sulu Sea and west of the Kei-islands, *Ples. unidens* Bate, distinguished from all the other species by the compressed tooth on the middle of the 3rd abdominal tergum, is known from the Bali Sea and from near the Kei-islands, near the latter locality occurs also *Ples. rostricrescentis* (Bate), a rare form of which only one specimen is known; the four other species, inhabiting the Archipelago, are the new *Ples. assimilis*, obtained in Madura-bay and other localities in the southern part of Molo-strait, *Ples. binoculus* (Bate) known from the strait between the islands of Rotti and Timor, from the strait between the islands of Flores and Solor and from the Arafura Sea, *Ples. ocellus* (Bate), taken near Samboangan, Philippine Islands, but of which it is still doubtful, whether it occurs also in the Andaman Sea and near the Hawaiian Islands and, finally, *Ples. bifurca* Alcock & Anderson, which has been captured at several localities of the Archipelago. The seas of New Britain and north of New Guinea are inhabited by *Ples. longirostris* (Borr.) and *Ples. unidens* Bate. Several species have been observed near the Hawaiian Islands, three of them, *Ples. brevis* (Rathbun), *exigua* (Rathbun) and *spinidorsalis* (Rathb.) have not yet been found elsewhere; the rest are *Ples. ensis* (A. M.-Edw.), *martia* (A. M.-Edw.), *Sindoi* (Rathb.) and a form that was referred by Miss Rathbun with some doubt to *Ples. ocellus* (Bate). Besides *Ples. martia* (A. M.-Edw.) and *Ortmanni* Dofl. still a third species is recorded from the seas of Japan, viz. *Ples. hypanodon* Dofl., a form closely related to *Ples. brevis* (Rathb.) from Hawaii. Off Cape Natal, South Africa, *Ples. longirostris* (Borr.) has been taken and in the western Indian Ocean *Ples. gracilis* Borr., from the seas, finally, around the coasts of India *Ples. bifurca* Alcock & Anderson, *ensis* (A. M.-Edw.), *martia* (A. M.-Edw.) and *unidens* Bate are known, furthermore *Ples. Alcocki* A. R. S. Anderson, a form not yet observed elsewhere, and at last a species, that probably must be referred to the Hawaiian *Ples. Sindoi* Rathb.

As regards the vertical range it must be remarked that the species of the genus *Plesionika* usually occur in moderate depths or even in shallow water. The majority of the species, nearly two-thirds of the whole number known, were captured in less than 400 fathoms, while only four are recorded from a greater depth than 700 fathoms. These four species are *Ples. martia* (A. M.-Edw.), a large series of which was obtained by the "Woy Woy", October 1906, in the Tasman Sea when the trawl was lowered in 800 fathoms, but this species

has usually been observed in less deep water, so e. g. off Lion's Head, South Africa, in 131 to 136 fathoms, *Ples. Parfaiti* (A. M.-Edw.) and *Ples. geniculata* (A. M.-Edw.) dredged by the "Travailleur" at a depth of 738 fathoms and, finally, the little *Ples. caprcensis* Lo Bianco, which was taken in 1260 fathoms near the island of Capri.

Key to the indopacific species of the genus *Plesionika* Bate.

a_1 The legs of the 2nd pair are of equal or nearly equal length.

b_1 Rostrum longer than antennal scale (in one species, *Ples. brevirostris* Bate, in which the rostrum is about as long as the scaphocerite, the lower border is smooth, while the upper is smooth beyond the basal joint of antennular peduncle).

c_1 The dorsal border of the rostrum, beyond the tip of the antennular peduncle, is quite smooth.

d_1 Lower margin of the rostrum dentate.

e_1 The ventral border of the rostrum is very closely and evenly serrated; ocellus distinct.

f_1 The posterior border of the 3rd abdominal tergum, though convex, is not acutely produced.

g_1 Rostrum from 45 to 67 per cent. of the length of the body, when the body is measured from the back of the orbit to the tip of the telson . . . . . *martia* (A. M.-Edw.)

(A. MILNE-EDWARDS, Recueil de Figures de Crustacés nouveaux ou peu connus, 1ère Livr., 1883, Pl. 21).

g_2 Rostrum from 34 to 47 per cent. of the length of the body, when the body is measured from the back of the orbit to the tip of the telson . . *martia* (A. M.-Edw.) var. *semilaevis* Bate

f_2 The posterior border of the 3rd abdominal tergum is acutely produced into a sharp tooth that overlaps the next tergum *ensis* (A. M.-Edw.)

(A. MILNE-EDWARDS, in: Annal. Sc. Nat., Zool. (6) XI, 1881, Art. 4, p. 14; Recueil Fig. Crust. nouv. 1883, Pl. 18).

e_2 The ventral border of the rostrum is armed with a series of distant spines; no ocellus . . . . . *Alcocki* (A. R. S. Anderson)

(A. R. S. ANDERSON, in: Journ. Asiat. Soc. Bengal, Vol. LXV, pt. 2, 1896, p. 92; Illustrations of the Zoology of the Investigator, Crustacea, Pl. LII, Fig. 2 ♂, Fig. 4 ♀).

d_2 Lower margin of the rostrum free from spines, rostrum subequal with the antennal scale . . . . . *brevirostris* Bate

(C. SPENCE BATE, Report Challenger Macrura, 1888, p. 650, Pl. CXIII, fig. 5).

c_2 At the base of the rostrum two strong teeth stand above the eye; of the rostrum proper the hindermost third is unarmed,

the rest bears above eight minute spinules, widely set, the last two being somewhat larger than the rest . . . . . *gracilis* Borr. [1])

(L. A. Borradaile, in: The Transact. of the Linnean Soc. of London, 2nd Ser. Zoology, Vol. XVII, Part 3, 1917, p. 398, Pl. 58, fig. 1*a*, Pl. 59, Fig. 1*b*.)

c_2 The dorsal border of the rostrum is spinose in all its extent.

d_1 Dactyli of the three posterior legs long and slender, the dactylus of the 4th pair measuring at least one-fifth of the propodus.

e_1 Carpus of the three posterior legs conspicuously longer than the propodus, the carpus of the 3rd pair 2—2$^1/_2$-times as long as the propodus, dactylus of the 4th pair one-fifth of the propodus.

f_1 Rostrum almost twice as long as the carapace, upper border armed with 50—55, lower with about 70 teeth . . . *longipes* (A. M.-Edw.)

(A. Milne-Edwards, Recueil Figures Crust. nouv. 1883, Pl. 20).

f_2 Rostrum one and a half as long as the carapace or a little shorter, upper border armed with 27—33, lower with 22—27 teeth . . . . . *longipes* (A. M.-Edw.) var. *indica* de Man

e_2 Carpus of the three posterior legs little longer than the propodus, the carpus of the 3rd pair 1$^1/_2$-times as long as the propodus, dactylus of the 4th pair one-third of the propodus *Ortmanni* Dofl.

d_2 Dactyli of the three posterior legs short, the dactylus of the 4th pair measuring less than one-tenth of the propodus.

g_1 Lower margin of the rostrum with numerous, 20 or more spines; dactylus of the 4th pair of legs measuring (according to the figure in Borradaile's paper) $^1/_{18}$ the length of the propodus. . . . . *longirostris* (Borr.)

(L. A. Borradaile, in: A. Willey's Zoological Results, Part IV, Sept. 1899, p. 413, Fig. 10*a*—10*h*).

g_2 Lower margin of the rostrum with 6 teeth; dactylus of the 4th pair of legs measuring about $^1/_{11}$ the length of the propodus . . . . . *Sindoi* (Rathb.)

b_2 Rostrum shorter than antennal scale.

h_1 Three teeth of the upper border of the rostrum behind the orbital margin, lower margin smooth . . . . *hypanodon* Dofl.

(F. Doflein, Ostasiatische Dekapoden, München 1902, p. 615, Taf. III, Fig. 1).

h_2 Five teeth of the upper border of the rostrum behind the orbital margin; lower margin with one tooth near the tip *brevis* (Rathb.)

(M. J. Rathbun, in: U. S. Fish Commission Bulletin for 1903, Part. III, Wash. 1906, p. 916, Fig. 65).

1) This species is placed here with some doubt, because the description does not mention whether the legs of the 2nd pair are equal or not: according to Mr. Borradaile, however, it appears to be related to *Ples. martia* (A. M.-Edw.) and *Ples. ensis* (A. M.-Edw.).

a_2 The legs of the 2nd pair are conspicuously unequal in length.

b_1 Third abdominal tergum compressed and carinated in the middle, the carina ending abruptly, like a tooth, at the posterior fourth. Rostrum more than twice as long as the carapace, upper border with a solitary tooth a little behind the apex besides 6 or 7 teeth at the base . . . . . *unidens* Bate

b_2 No carinate tooth on the middle of third abdominal tergum.

c_1 Ocellus distinct. Rostrum conspicuously longer than antennal scale.

d_1 Abdomen at the utmost three times as long as the carapace.

e_1 Carpus of the legs of the 3rd pair shorter than the propodus.

f_1 Dactylus of the three posterior legs very short, measuring one-fifth of the propodi. A more or less long part of the upper margin of the rostrum, beyond the tip of the antennular peduncle, is smooth, unarmed.

g_1 Stylocerite reaching to the distal extremity of antennular peduncle. Rostrum crescent-shaped. Ocellus circular . *rostricrescentis* Bate

(C. Spence Bate, Report Challenger Macrura, 1888, p. 653, Pl. CXIV, fig. 1).

g_2 Stylocerite reaching to the middle of the 2nd joint of antennular peduncle. Rostrum at first very little depressed, nearly horizontal, but from the 2nd joint of antennular peduncle strongly curved upward. Ocellus elliptical . *assimilis* de Man

f_2 Dactylus of the three posterior legs long, measuring one-third of the propodi. Teeth of the upper margin of the rostrum proper placed at subequal distances, leaving no long smooth interspace between them . . . . . *binoculus* (Bate)

e_2 Carpus of the legs of the 3rd pair much longer than the propodus . . . . . *ocellus* (Bate)

(C. Spence Bate, Report Challenger Macrura, 1888, p. 657, Pl. CXIV, fig. 3).

d_2 Abdomen nearly four times as long as the carapace. Rostrum bent strongly downward in front of eyes, terminal half ascending. Transverse diameter of eyes not exceeding axial. A species of small size, length of carapace 4,3 mm. *exigua* (Rathb.)

(M. J. Rathbun, in: U. S. Fish Commission Bulletin for 1903, Wash. 1906, Part III, p. 916, Pl. XXI, fig. 2).

c_2 No ocellus. Rostrum either a little shorter or but little longer than the antennal scale.

d_1 Of the 6 to 9 teeth of the upper border of the rostrum four, rarely three, stand on the carapace behind the orbital margin *bifurca* Alcock & Anderson

d_2 Of the 13 teeth of the upper border of the rostrum seven to nine stand on the carapace behind the orbital margin *spinidorsalis* (Rathb.)

(M. J. Rathbun, in: U. S. Fish Commission Bulletin for 1903, Wash. 1906, Part III, p. 917, Pl. XXI, fig. 5).

1. *Plesionika martia* (A. M.-Edw.) var. *semilaevis* Bate. Pl. X, Fig. 24—24*b*.

Pandalus martius A. Milne-Edwards, Recueil de Figures de Crustacés nouveaux ou peu connus, Avril 1883, Pl. 21.
Plesionika Martia M. Caullery, Campagne du "Caudan", Paris 1896, p. 378, pl. XV, fig. 1—6.
Pandalus Martius Th. Adensamer, in: Denkschr. Kais. Akad. Wiss. Bd. LXV, Wien 1898, p. 624.
Pandalus (Plesionika) martius A. Alcock, Catal. Indian Deep-Sea Crustacea, 1901, p. 95.
Pandalus martius A. Senna, Bull. Soc. Entomol. Ital. XXXIV, 1903, p. 308, Tav. XIV, fig. 6—13, Tav. XV, fig. 1—4.
Pandalus martius M. J. Rathbun, in: U. S. Fish Commission Bulletin for 1903, Part III, Wash. 1906, p. 914.
Pandalus (Plesionika) martius A. R. Mc Culloch, in: Records of the Australian Museum, Vol. VI, Part 5, 1907, p. 355.
Pandalus (Plesionika) martius R. E. Lloyd, in: Records Indian Museum, Vol. I, Pt. 1, Calcutta 1907, p. 4.
Plesionika martia Stanley W. Kemp, in: "Fisheries, Ireland, Sci. Invest.", 1908, I. [1910], Dublin, p. 93, Pl. XII, figs. 1—4.
Plesionika martia Th. R. R. Stebbing, in: Annals South African Museum, Vol. VI, London, 1910, p. 392.
Plesionika martia H. Balss, Ostasiatische Decapoden, II, München 1914, p. 30.
Plesionika semilaevis C. Spence Bate, Report Challenger Macrura, 1888, p. 644, Pl. CXIII, fig. 3.

Stat. 12. March 14. 7° 15′ S., 115° 15′.6 E. Bali Sea. 289 m. Bottom mud and broken shells. 83 specimens of medium size, viz. 41 males and 42 females, all but 5 ova-bearing.
Stat. 38. April 1. 7° 35′.4 S., 117° 28′.6 E. Bali Sea. 521 m. Bottom coral. 6 specimens of medium size, viz. 3 males and 3 ova-bearing females.
Stat. 74. June 8. 5° 3′.5 S., 119° 0′ E. Off Makassar. 450 m. Bottom Globigerina ooze. 4 specimens of medium size, viz. 2 males and 2 females, one of which with eggs, and 1 very young specimen.
Stat. 100. June 29. 6° 11′ N., 120° 37′.5 E. Sulu Sea. 450 m. Bottom dead coral. 1 male of medium size.
Stat. 173. Aug. 28. 3° 27′.0 S., 131° 0′.5 E. Between Ceram and New Guinea. 567 m. Bottom fine, yellow grey mud. 1 adult, full-grown male.
Stat. 262. Dec. 18. 5° 53′.8 S., 132° 48′.8 E. Kei-islands. 560 m. Bottom solid bluish grey mud, upper layer more liquid and brown mud. 1 young female without eggs and 1 still younger specimen.
Stat. 297. January 27, 1900. 10° 39′ S., 123° 40′ E. Off the island of Rotti. 520 m. Bottom soft, grey mud with brown upper layer. 1 male of medium size.
Stat. 306. Febr. 8, 1900. 8° 27′ S., 122° 54′.5 E. Lobetobi Strait. 247 m. Bottom sandy mud. 96 specimens of small size, among which, however, many are provided with eggs.
Stat. 312. Febr. 14, 1900. 8° 19′ S., 117° 41′ E. Saleh-bay, north coast of Sumbawa. 274 m. Bottom fine, sandy mud. 287 specimens of small size, males and ova-bearing females.
Stat. 316. Febr. 19, 1900. 7° 19′.4 S., 116° 49′.5 E. Bali Sea. 538 m. Bottom fine, dark brown sandy mud. 6 young females without eggs.

Plesionika martia is one of the common shrimps of deep water, it was dredged in plenty in the Andaman Sea (A. Alcock, l. c.) and Miss Rathbun (l. c.) remarks that over 700 specimens were captured near the Hawaiian Islands in fifty hauls. It is therefore not surprising that almost 400 specimens have been obtained by this expedition, but it is to be regretted that there is only one full-grown specimen in this large collection, the male from Stat. 173, that has a length of 169 mm. from tip of rostrum to end of telson: the specimens from the

Stations 12, 38, 74, 100 and 297 are all of medium size, 100—125 mm. long, while those that were taken at the Stations 306 and 312 are still considerably smaller, measuring 65—80 mm., so that they are even not yet half as long as the male from Stat. 173.

The examination of this collection proved in the first place that, like *Ples. Ortmanni* Dofl. (H. Balss, l. c. p. 31), also *Ples. martia* belongs to those species in which the ova-bearing individuals vary considerably in length, to those in which the reproductive organs are already developed at a tender age, so that the animal is enabled to procreate from that age until its death; not only, indeed, are the ova-bearing females from the above-mentioned Stations of medium size, but the numerous egg-laden specimens from the Stations 306 and 312 are still quite young, being not yet half as long as the full-grown specimen from Stat. 173. While the medium-sized and adult specimens, preserved in alcohol, show all the same uniform straw colour, in the young individuals from the Stations 306 and 312 the first to third abdominal terga are often marked with a transverse blackish or dark coloured band, though a great number of them are also quite unspotted.

The measurements revealed furthermore the fact, already suggested by Stanley Kemp (l. c. p. 95), that in the indian representatives of *Ples. martia* the rostrum is constantly shorter, comparatively, than in the typical species from the Mediterranean and the East Atlantic (see the Tables of measurements): it is therefore justified to regard the indian form as a variety *semilaevis* Bate. When the length of the body is measured from the back of the orbit to the tip of the telson, the rostrum varies in ten medium-sized specimens, collected at Stat. 12, from 39 per cent. to 47 per cent. of the length of the body, according to Senna's measurements (l. c.) in seven specimens from the Mediterranean, however, from 45 to 58 and according to those of Stanley Kemp in eleven full-grown and medium-sized specimens from the coasts of Ireland from 51 to 67. In the full-grown male from Stat. 173 the ratio of rostrum to body (100) is even only 34.

When the rostrum is included, its proportion to body proved to be only 25 per cent. of the length of the latter in the adult male from Stat. 173, while it varied from 28 to 32 in the ten medium-sized specimens from Stat. 12, in the eleven adult or medium-sized specimens, mentioned by Kemp, this proportion, however, varied between 34 and 40 and in 5 medium-sized specimens from the Mediterranean between 32 to 37 (Senna, l. c.). Like in most species, also in *Ples. martia* the rostrum appears comparatively longer in younger specimens, which fact is also proved by the Table: the measurements of these younger specimens are therefore not comparable with those of Senna or Kemp, whose specimens were adult or of medium size.

Unnecessary to remark that the relative length of the rostrum varies also rather much in the numerous specimens of this collection. In the adult male, long 169 mm., from Stat. 173 the rostrum is only one-third longer than the carapace, in the specimens of medium size the proportion between the length of the rostrum and the carapace varies from 1,6 to 2,2 and in the young specimens from the Stations 306 and 312 from 2,2 to 2,9, the rostrum appearing in the latter sometimes almost 3-times as long as the carapace: these numbers prove again that with advancing age the rostrum becomes relatively shorter.

According to Stanley Kemp (l. c. p. 94) the rostrum is armed dorsally in the typical

species with from five to ten teeth, usually eight or nine, in a specimen from Lion's Head, South Africa (STEBBING, l. c.) eight teeth stood on the upper border of the rostrum and according to Col. ALCOCK in the species from the coasts of India the rostrum is also armed with from five to eight — usually eight — teeth. In the variety *semilaevis* Bate the usual number of dorsal teeth on the rostrum of medium-sized specimens proved to be six, less usually seven, while eight teeth were rarely observed: among 66 medium-sized specimens the rostrum was armed dorsally in 35 with six, in 21 with seven, in 6 with eight and in 4 with five teeth. In the full-grown male from Stat. 173 there were also eight teeth, but this belongs no doubt to the exceptions. Usually in specimens of medium size the two first teeth stand on the carapace behind the orbit, more rarely three are observed: among the 66 specimens in 48 two teeth stood on the carapace, in 16 three and in 2 four, a great exception indeed. These two or three teeth that stand on the carapace, are almost constantly considerably smaller than the following. In the young specimens from the Stations 306 and 312 the usual number of teeth on the dorsal side of the rostrum proved to be seven, more rarely six or eight, while in an ova-bearing female, the carapace of which was 9 mm. long, nine dorsal teeth stood on the latter: among 34 specimens from these Stations in 21 seven teeth were observed, in 5 six, in 7 eight and in 1 nine. In these specimens the anterior tooth stands usually a little before the distal extremity of the antennular peduncle to near the tip of the antennal scales, which fact does never occur in the older specimens; in these younger individuals more often three teeth are placed on the carapace than in the larger ones, among the 34 examined in 18 three, in 15 two teeth were observed, while in an ova-bearing female, in which the carapace and the rostrum were respectively 9,25 mm. and 24 mm. long, four teeth were placed on the carapace.

The rostrum is continued backwards as a blunt carina, which in the adult male evanesces a little behind the middle of the carapace; posterior to the carina one observes, like in other species, in the mid-dorsal line a very small tubercle, situated about twice as far from the carina as from the hind margin of the carapace and in old individuals, like in the male from Stat. 173, the cardiac region appears moreover a little uneven. The branchiocardiac groove is rather deep and runs obliquely in the direction of the angle between the straight dorsal and the curved lateral part of the posterior margin of the carapace, but it does not reach this margin and in the adult male extends even not as far backwards as the median tubercle on the cardiac region. It is of course erroneous when CAULLERY (l. c.) remarks "le céphalothorax ne présente pas de carène". The orbital spine is well-developed and extends in the adult male as far forward as the 2nd joint of the antennal peduncle, while the branchiostegal spine, that is directed obliquely downward, is much smaller and shorter.

In the adult male from Stat. 173 the abdomen, telson included, appears three times as long as the carapace, the former being 94,5 mm. long, the carapace 32 mm.; the 6th somite is one and a half as long as the 5th, the telson is broken at the tip. In the medium-sized specimens it is as long as the endopodite of the caudal fan or a little longer, though shorter than the exopodite, in the young specimens from the Stations 306 and 312 the telson is usually even a little shorter than the endopodite.

Only in a comparatively small number of specimens one or more of the three posterior

legs are completely preserved, while in the rest these legs are partly or entirely broken off: this is a great pity in connection with the remarkable fact that the measurements of the three posterior legs vary rather considerably. STANLEY KEMP has first observed this variability, for in his valuable work on the Decapoda Natantia of the coasts of Ireland he writes, p. 95: "The exact length of these limbs is by no means constant; the female specimen mentioned above probably represents an extreme case". When we look at the Table of Measurements, in which the exact length of the joints of one or more posterior legs of 21 specimens has been recorded, the following observations can be made. The carpus appears nearly equally long in the 3rd, 4th and 5th pair; it measures in the 3rd pair about three-fifths, in the 4th two-thirds and in the 5th about four-fifths of the respective merus and ischium combined. In the adult male from Stat. 173 the propodus of the 3rd legs is little shorter than the carpus, but almost in all the other specimens it is considerably shorter, measuring only one-half to two-thirds the length of the carpus: in the young female from Stat. 262 and in a young male from Stat. 316 the propodus appears a little longer than the carpus! In the figure of *Ples. martia* in A. MILNE-EDWARDS' "Recueil" the three posterior legs are no doubt incorrectly figured, because the propodus of the 5th leg appears shorter than that of the 3rd, which certainly never takes place. In the figure of this species, published by SENNA (l. c.), the carpus of the 3rd pair appears slightly shorter than the propodus, like in the adult male from Stat. 173, in KEMP's figure (l. c. Pl. XII) and in the figure of *Ples. semilaevis* in the Report on the Challenger Macrura (Pl. CXIII, fig. 93), both joints show about the same length. In the adult male from Stat. 173 the propodus of the 4th pair is nearly one and a half as long as the carpus, almost as in BATE's figure, and in the young male, long 96 mm., from Stat. 316 even more than twice as long as the carpus, but in the male N° 6 from Stat. 12 the propodus is hardly one-third longer than the carpus and in the other specimens the carpus is just as long or even a little longer than the propodus. In the figures of SENNA and KEMP the propodus of the 4th pair appears almost twice as long as the carpus. The 5th legs of the young male from Stat. 316 resemble the figures of the typical species in the papers of SENNA and KEMP, the propodus being nearly $2^1/_2$-times as long as the carpus; in BATE's figure of *semilaevis* the propodus appears twice as long as the carpus, such a specimen is the male N° 6 from Stat. 12. In the few other specimens in which these legs were still preserved, the propodus is only one and a half as long as the carpus or little more, in the young specimen N° 20 from Stat. 312 the propodus is even only one-third longer than the carpus. These variations in the relative length of the joints of these legs do not seem to depend upon the age of the specimens. The specimens N° 6 and N° 21, respectively only 97 mm. and 96 mm. long, nearly agree with KEMP's figure of a full-grown, ovigerous female, while this is not the case with the other specimens, that are longer and thus much older. Unfortunately no measurements at all of the three posterior legs are given by the authors which have described or studied this species. New investigations and measurements both of indopacific and east atlantic or mediterranean specimens are therefore necessary in order to decide the question, whether constant differences exist or not between the typical species from the East Atlantic and the variety *semilaevis* from the indopacific seas, as regards the measurements of these legs.

Table A.

Number of specimen.	Length of body, rostrum included.	Length of rostrum.	Ratio of rostrum to body, when the rostrum is included.	Ratio of rostrum to body, when the rostrum is excluded.
1	113	34,5	30,5	44
2	112	34,5	30,8	44
3	111,5	36	32	47
4	111	32,5	29,3	41
5	125	36	29	41
6	121	38,5	32	47
7	121	37,5	31	45
8	116	32,5	28	39
9	114,5	34,5	30	43
10	101	30,5	30	43
11	123	36,5	30	42
12	169	42,5	25	34
13	72	24,5	34	52
14	70	25	36	55
15	67,5	22,5	33	50
16	67	24	36	56
17	78	27,5	35	54
18	76,5	29	38	61
19	73	24,5	33	51
20	71	23,5	33	50

N° 1—10 Stat. 12; N° 11 Stat. 38; N° 12 Stat. 173; N° 13—20 Stat. 306.

Table B.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Length of body, rostrum included		116	114	113	110	106	97	121	120	119	118	117	169	104	83	74	73	72	68	67	85	96
												l. r.										
Length of merus and ischium combined	of the 3rd legs	25	.	27,5	25	.	25	28	.	28	27	26,5 26,5	30	21	18,5	16	.	.	16	.	18	18
Length of carpus		15	.	16,3	16	.	19,5	17	.	17	15,5	17,5 15,5	16	10,75	11,75	10,5	.	.	11	.	12	11
„ „ propodus		8,6	.	8,5	9	.	10	8,5	.	9	10	8,5 9,5	14,5	13	6,75	6,4	.	.	6	.	7	12,75
„ „ dactylus		2,9	.	3	3	.	2,9	1,9	.	3	3	2,5 3	3,5	1,7	3,2	2,75	.	.	1,3	.	3,2	1,75
Length of merus and ischium combined	of the 4th legs	21	.	22,5	.	21	22,5	24	.	23	23,5	.	27	.	15	.	.	14	.	13,5	16	16
Length of carpus		14,75	.	15	.	14	18	16	.	17,5	16	.	16,5	.	11,5	.	.	10	.	9,5	11,5	11
„ „ propodus		14,5	.	14,3	.	13,5	23	16	.	14	16	.	23,2	.	11	.	.	9,5	.	9,75	11	24
„ „ dactylus		2	.	2,2	.	1,8	2,2	2,25	.	2	2,4	.	3	.	1,75	.	.	2,3	.	2	2,5	.
Length of merus and ischium combined	of the 5th legs	20,5	20,5	.	.	19,5	19	.	24	21,5	.	.	.	.	13	.	13	12,5	.	.	14	14,5
Length of carpus		15,5	16	.	.	15	18,2	.	18	16	.	.	.	.	11,25	.	11,5	10,4	.	.	12	12,3
„ „ propodus		25,5	24,5	.	.	24	36,3	.	28,5	28,5	.	.	.	.	.	.	16	.	.	.	16,5	31,5
„ „ dactylus		.	1,5	.	.	1,75	1,9	.	2,25	2	.	.	.	.	.	.	2,6	.	.	.	2,8	.

N° 1—11 Stat. 12, N° 1—6 males, N° 7—11 ova-bearing females; N° 12 male from Stat. 173; N° 13 female from Stat. 262; N° 14—19 young specimens from Stat. 306, N° 14, 15, 18 and 19 ova-bearing; N° 20 young specimen from Stat. 312; N° 21 young specimen from Stat. 316.

General distribution: The typical species is known from the East Atlantic (A. Milne-Edwards), from the coasts of Ireland (Stanley Kemp), from the Bay of Biscay (Caullery). from the Spanish coast (Wolfenden) and from the Mediterranean (Adensamer, Riggio, Senna). The variety *semilaevis* Bate was obtained by the "Challenger" between the Philippine Islands and Borneo, off Sydney Harbour, Australia, off the Kermadec Islands and off Matuka, Fiji Islands (Bate and McCulloch). It occurs also at Lion's Head, South Africa (Stebbing), probably also in Sagami Bay, Japan (Balss) and at the Hawaiian Islands (Rathbun). Whether the species, observed by Alcock in the Andaman Sea, in the Bay of Bengal and in the Arabian Sea, belongs also to the variety, appears doubtful, because, according to the measurements mentioned by this author, the rostrum should be as long as in the typical species.

2. *Plesionika longipes* (A. M.-Edw.) var. *indica* de Man. Pl. X and XI, Fig. 25—25*g*.

Pandalus longipes A. Milne-Edwards, in: Annal. Scienc. Nat., Zool., (6) XI, 1881, Art. N° 4, p. 15 and in: Recueil de Figures de Crustacés nouveaux ou peu connus, Avril 1883, Pl. 20.
Plesionika longipes (A. M.-Edw.) var. *indica* J. G. de Man, in: Zoolog. Mededeelingen, uitgegeven vanwege 's Rijks Museum van Natuurlijke Historie te Leiden. Deel III, Afl. 4, Dec. 1917, p. 279.

Stat. 254. Dec. 10. 5° 40′ S., 132° 26′ E. Near the Kei-islands. 310 m. Bottom fine, grey mud. 1 male and 8 ova-bearing females.

Plesionika longipes (A. M.-Edw.), which was obtained by the expedition of the "Blake" off the island of Barbados, West-Indies, at a depth of 200 fathoms, is only known by the brief description of 1881 and by the figures published by A. Milne-Edwards in the quoted "Recueil": this species has never been found again since its discovery by the "Blake". It is therefore very interesting that *Ples. longipes* has been trawled by the Siboga expedition near the Kei-islands, so that this fact does remind us of *Ples. martia* (A. M.-Edw.) and other West-indian forms which show the same geographical distribution.

In the specimens, collected by the "Siboga", the number of rostral teeth both on the upper and the lower margin is, however, s m a l l e r than in the West-indian typical species, the rostrum is a little shorter, less upturned and the 1st tooth of the upper margin stands a little more forward: it is therefore that they are here described as a new variety *indica*.

This species is a true *Plesionika*, the external maxillipeds namely are furnished with an exopodite, the epipodites are wanting on the last leg only, the posterior lobe of the scaphognathite is broadly rounded and the rostrum is armed dorsally only with fixed teeth.

The male is 157 mm. long, the females 164—190 mm. from tip of rostrum to end of telson: this variety has thus the same size as the typical species and both belong to the largest representatives of the genus. The Table of Measurements shows that the length of the carapace of full-grown specimens varies from 33 to 39 mm.; the carapace appears a little more than one and a half as long as high, the proportion being like 5 : 3. In some specimens the rostrum is almost one and a half as long as the carapace, in one (N° 5) even slightly more, while in other ones the difference of length is much smaller. The postrostral carina rises rather suddenly just in the middle of the carapace as a well-defined, though obtuse crest, which in its posterior

half is slightly curved, as is also visible in the figure of the "Recueil". The posterior half of the carapace is evenly rounded dorsally. The rostrum (Fig. 25*a*) is at first somewhat depressed to a little beyond the antennular peduncle and runs from here straight forward, only slightly ascendant, so that the apex is situated at the same level as the curved part of the postrostral crest: in the typical species from Barbados the rostrum is much more upturned and twice as long as the carapace. Dorsally the rostrum is armed with 27—33 fixed teeth, of which usually the first five, rarely four or six, stand behind the orbital margin; the 1st tooth, which is very small, is placed at $^1/_9$—$^1/_{10}$ the length of the carapace from the orbital margin, the following gradually increase in length to about the middle of the proper rostrum, while the remaining teeth that reach to the tip, gradually again diminish in size and therefore appear again more close-set than those in the middle. The lower margin is armed with 22—27 teeth, from about the distal extremity of the antennular peduncle to the tip; these teeth are smaller than those of the upper border, close-set and diminish also gradually in size. According to the figure in the "Recueil" in the West-indian typical species the upper border should be armed with 50 to 55, the lower with about 70 teeth.

Orbital spine small, short, not yet reaching the cornea of the eyepeduncles and not buttressed by a carina; branchiostegal spine smaller than the orbital, directed obliquely downward and projecting less forward than the orbital. An impressed point or pit exists, at one-third the length of the carapace from its anterior margin, at the level of midway between the orbital and the branchiostegal spine. Branchiocardiac groove slightly indicated, for the rest the carapace is smooth.

Abdomen little longer than carapace and rostrum combined. On the 1st abdominal tergum are more or less distinct traces of four small tubercles, placed transversely and each of which shows an impressed point, the same tubercles which in some species of the genus *Heterocarpus* are so conspicuous; the two lateral are twice as far distant from one another as the two submedian ones. Posterior border of 3rd tergum convex, little prominent. Sixth abdominal somite nearly one and a half to almost twice as long as fifth. Telson almost as long as the 5th and 6th somite combined, sometimes slightly longer than the two preceding somites taken together; it is faintly grooved above and armed with 3 pairs of small dorso-lateral spinules besides those at the tip; sometimes it is as long as the endopodite of the tail-fan and distinctly shorter than the exopodite, sometimes as long as the exopodite, sometimes even a little shorter than the endopodite.

Eyestalks of moderate size, cornea large, ocellus quite distinct and almost independent.

The antennular peduncle does not reach halfway along the antennal scale, namely along $^{11}/_{28}$ of its length, 1st joint as long as 2nd and 3rd together, 2nd and 3rd subequal. Stylocerite flattened, acuminate, reaching to the far end of the 2nd joint or just beyond it. Antennular flagella subequal, the inner about one-sixth longer than the body.

Spine at the outer lower angle of the 2nd joint of antennal peduncle rather short, stout, compressed, acuminate. Antennal peduncle reaching almost to the middle of the 3rd joint of antennular peduncle; scale (Fig. 25*b*) a little longer than two-thirds the length of the carapace, 4-times as long as wide, narrowing a little distally, outer margin slightly convex, terminal spine

small, shorter than the blunt extremity of the lamella. Antennal flagellum almost twice as long as the body.

In the left mandible (Fig. 25*c*) the cutting-edge of the incisor process is armed with six acute teeth, of which the first, at the opposite side of the palp, is a little larger than the 2nd; the 2nd and four following slightly increase in size, so that the 6th, at the same side as the palp, appears as large as the first. The outer margin of the truncate extremity of the molar process bears three obtuse, subequal teeth, while the brown inner margin is entire. In the right mandible (Fig. 25*d*, 25*e*) the incisor process bears four or five teeth, three or four of which are of equal size, while the fourth or fifth, at the side of the palp, is twice as large as the others. The outer margin of the truncate extremity of the molar process bears 6 or 7 blunt teeth of unequal size; at the inner side one observes a brown coloured, concave portion, the posterior obtuse angle of which is dentiform, while another smaller, obtuse tooth occurs posterior to it. The 1st or basal joint of the 3-jointed palp is produced posteriorly and distally into a truncate or obtuse process, 2nd joint slightly shorter than 1st, 3rd as long as 1st and 2nd taken together, flattened, not narrowing but truncate distally and almost 3-times as long as broad.

Of the two inner distal lobes of the 2nd maxilla (Fig. 25*f*), that project far beyond the basal lobe, the anterior is rounded and one and a half as broad as the posterior; posterior lobe of the exopodite rounded. Seventh joint of 2nd maxillipeds (Fig. 25*g*) applied as a strip to the 6th, nearly three times as broad as long. The external maxillipedes reach, both in the male and in the female, by their terminal joint beyond the antennal scale; terminal joint about $^1/_6$ shorter than the penultimate, that measures two-thirds of the antepenultimate; exopodite half as long as the latter.

Unfortunately in the single male the legs are wanting or incomplete. In the female the legs show the following characters and measurements. The legs of the 1st pair reach by two-thirds of their carpi beyond the antennal scale; their terminal joints, which at their subacute extremity show no trace of a microscopical chela, measure one-third of the carpi. The legs of the 2nd pair are very slender, equal and reach by the chela and half the carpus or a little more beyond the antennal scale; terminal joint of the carpus, which is nearly as long as that of the 1st pair, almost as long as the three preceding joints combined and one-fifth shorter than the chela; chela $^1/_{11}$ of the carpus, fingers as long as the palm. The three posterior legs are also very long and slender; those of the 3rd pair extend by the three last joints and a small part (about $^1/_9$) of the merus beyond the antennal scale, those of the 4th only by the three terminal joints, those of the 5th pair by the two last joints and almost the whole length ($^9/_{10}$) of the carpus. The three legs, however, slightly increase in length from the 3rd to the 5th, though the meri become gradually a little shorter in the same succession, because the carpi and the propodi distinctly increase in length. The dactyli of the 3rd pair measure almost one-third, those of the 4th about one-fifth, those of the 5th one-sixth of the propodi; the dactyli are flattened, narrow, lanceolate, and nearly straight. As results from the Table the proportions between the joints of these legs vary, however, rather much: so e. g. in N° 2 and N° 8 the propodi of the 5th pair are almost twice as long as those of the 3rd, in N° 3 and N° 6 only one and a half.

Table A.

Measurements in millimeters.

	1	2	3	4	5	6	7	8	9
Length of rostrum. . .	50	45	50	49,5	51	47,5	41	45	42
„ „ carapace . .	37	39	35	35	33	35	37,5	34	33
„ „ abdomen . .	103	96	90	90	90	87,5	90,5	85	82
Entire length	190	180	175	175	174	170	169	164	157
Rostral formula. . . .	$\frac{5}{3\,1}$ $\frac{}{2\,2}$	$\frac{6}{3\,2}$ $\frac{}{2\,6}$	$\frac{5}{3\,3}$ $\frac{}{2\,7}$	$\frac{4}{3\,0}$ $\frac{}{2\,2}$	$\frac{4}{2\,8}$ $\frac{}{2\,7}$	$\frac{5}{3\,3}$ $\frac{}{2\,3}$	$\frac{5}{2\,7}$ $\frac{}{2\,5}$	$\frac{5}{2\,9}$ $\frac{}{2\,3}$	

N° 1—8 ova-bearing females, N° 9 male, in which the rostrum is incomplete.

Table B.

Measurements in millimeters of the three posterior legs in the specimens 1—3, 6 and 8 of the preceding Table.

		1	2	3	6	8
Length of merus	of 3rd leg	56	53	58,5	53	55
„ „ carpus		37	41	43	39	40
„ „ propodus		15	16,5	18,5	19	16,5
„ „ dactylus		4,5	5,3	5	5,5	5
Length of merus	of 4th leg	54	51	56	52	53
„ „ carpus		40,5	47	50	45	46
„ „ propodus		22,5	22	24,5	24	23
„ „ dactylus		4,5	4,5	.	5	4,3
Length of merus	of 5th leg	51	45	55	50	49
„ „ carpus		52	45	62	50	48
„ „ propodus		.	30	27	28	30
„ „ dactylus		.	4,5	4,5	5	3,8

Eggs very numerous and small.

Geographical distribution: The typical *Plesionika longipes* (A. M.-Edw.) was taken by the "Blake" off the island of Barbados, West-Indies, at a depth of 200 fathoms.

3. *Plesionika Ortmanni* Doﬂ. Pl. XI, Fig. 26, 26*a*.

Plesionika ortmanni F. Doflein, Ostasiatische Dekapoden, München 1902, p. 616, Taf. III, Fig. 2.
Plesionika ortmanni H. Balss, Ostasiatische Decapoden II, München 1914, p. 30, Fig. 14.

Stat. 15. March 15. 7°2′.6 S., 115°23′.6 E. Bali Sea. 100 m. Bottom fine coralsand. 1 male and 1 female.

The two specimens are of the same medium size and the female has no eggs. The male is 52 mm. long from apex of rostrum to tip of telson, the rostrum being 17 mm. long, the carapace 8,75 mm., the abdomen 26,25 mm.; in the female the rostrum is broken off a little behind the tip. The rostrum, which in the male is almost twice as long as the carapace, is first slightly depressed to a little beyond the tip of the antennular peduncle and from here obliquely turned upward, so that the apex is situated above the level of the carapace; the dorsal crest gradually commences nearly in the middle of the carapace, but the 1st tooth is

placed not far from the orbital margin, at one-seventh of the distance between the latter and the posterior margin of the carapace. The upper border is armed with 17 teeth, the three first stand on the carapace and, though slightly increasing in length, are distinctly smaller than the 4th, which is placed above the orbital margin; the two first are articulated and thus probably movable and this is perhaps also the case with the 3rd; the 4th to 8th tooth are of equal size, placed at equal distances except the 8th which is a little farther distant from the 7th than the preceding and this 8th tooth is placed near the middle of the antennal scale, just in front of the antennular peduncle. The following teeth become gradually smaller, the distance between the 8th and the 9th is a little longer than that between the 8th and the 7th and the distance between the 9th and the 10th is still a little longer, the longest distance of all, but from here the distances become gradually shorter; the foremost tooth stands as far from the tip of the rostrum as from the penultimate. The lower margin bears 10 or perhaps 11 teeth that are much smaller than the 4th—8th tooth of the upper margin; the 1st stands between the 8th and 9th of the upper margin, the 2nd nearly midway between the 9th and the 10th, the distances between the following gradually diminish in length. The rostrum is narrow and tapers slightly to the tip. The rostrum of the female resembles, as far as it is preserved, that of the male, but the distance between the 8th and the 9th tooth of the upper margin is the longest of all.

Antennal spine reaching to the cornea of the forwardly stretched eyestalks, branchiostegal spine very small, much smaller than the other; carapace for the rest quite smooth.

Abdomen nearly as long as carapace and rostrum combined, 3-times as long as the carapace; all the abdominal terga, even the telson, are rounded, smooth; posterior margin of 3rd tergum slightly convex, 6th somite (4,5 mm.) of the male almost twice as long as the 5th (2,5 mm.), telson (6,75 mm.) one and a half as long as 6th somite, a little shorter than the inner, but much shorter than the outer uropod.

Cornea as broad nearly as the eyestalk is long, ocellus quite distinct, circular, almost independent, only anteriorly in contact with the cornea. Antennular peduncle short, reaching only along the proximal third part of the antennal scale, 3rd joint a little longer than 2nd; outer flagellum as long as the body, rostrum included, widened proximal part measuring about $^1/_7$ the entire length of the flagellum; inner flagellum about four-fifths of the other. Stylocerite acute, as long as basal antennular article.

Antennal scale (7,8 mm.) almost as long as the carapace and almost half as long as the rostrum, in the male; it is narrow, 5-times as long as wide proximally and narrows distinctly anteriorly; outer margin straight, terminal spine as long as the tip of the blade. Antennal peduncle reaching to the distal extremity of the 2nd joint of the antennular peduncle; flagellum one and a half as long as the entire length from apex of rostrum to tip of telson.

The external maxillipeds reach by the terminal joint and one-fifth of the penultimate beyond the antennal scale; exopodite reaching almost to the middle of the antepenultimate joint.

The peraeopods of the 1st pair reach by their terminal joint (propodus) beyond the apex of the rostrum, by their terminal joint and the distal third of the carpus beyond the external maxillipeds; carpus twice as long as the terminal joint, which seems to bear a rudimentary chela at the far end, long about $^1/_{20}$ of the propodus.

The peraeopods of the 2nd pair are equal and slender, those of the male reach by the chela and four-fifths of the carpus beyond the antennal scale, those of the female by the chela and the whole carpus; in the female the ischium extends to the middle of the terminal joint of the antennal peduncle and this is also the case in the male; the carpus is in the male 11 mm. long and composed of 33—35 joints, that in the middle are longer than anteriorly and posteriorly; the chela measures one-fifth of the carpus and the fingers are one-sixth shorter than the palm, a little gaping and unarmed, while, according to Doflein, the dactylus should be armed with a blunt tooth near the extremity. The 2nd legs of the female resemble those of the male, the fingers are hardly shorter than the palm.

Following legs long, slender, gradually diminishing in length; while in the male the legs of the 3rd pair reach by the dactylus, propodus, carpus and one-fifth of the merus beyond the antennal scale, of the 5th pair only the dactylus, propodus and two-thirds of the carpus project beyond it. As results from the following Table, the carpi gradually diminish in length, while the length of the propodi gradually increases from the 3rd to the 5th pair and the dactyli become also shorter. While accordingly the carpus of the 3rd pair is one and a half as long as the propodus, in the 5th pair these two joints show nearly the same length. The long and slender dactyli are almost straight and quite unarmed, without teeth or spines; those of the 4th pair measure just one-third of the propodi, the dactyli of the 3rd pair (Fig. 26*a*) are comparatively a little longer, while those of the 5th pair measure not yet one-fourth of the penultimate joint. Though these legs are long and slender, even the 3rd pair appears, however, still much shorter than the outer flagella of the upper antennae, which, as already remarked, are as long as the body. Like in the allied species the meri of the three posterior legs are armed with small spines.

Except on the last pair, the epipodites of all the legs are well-developed. According to Dr. Balss this species attains a length of 85 mm.

Table of Measurements in millimeters.

	Carpus		Propodus		Dactylus	
	1	2	1	2	1	2
Leg of the 3rd pair . .	12,6	12,3	7,9	8,2	3,1	3,1
Leg of the 4th pair . .	10,3	10,2	8,4	8,7	2,8	2,7
Leg of the 5th pair . .	9,6	9,8	9,4	9,8	2,05	2

N° 1 male from Stat. 15; N° 2 young specimen of *Ples. Ortmanni* Dofl., from Misaki, Japan, determined by Dr. Balss and received from him; this specimen had the same size as the two from Stat. 15.

4. *Plesionika Sindoi* (Rathb.). Pl. XI and XII, Fig. 27—27*c*.

Pandalus sindoi M. J. Rathbun, in: U. S. Fish Commission Bulletin for 1903, Wash. 1906, Part III, p. 915, Pl. XXI, fig. 4.

? *Pandalus (Plesionika) ocellus* A. Alcock, Descr. Catal. Indian Deep-Sea Crustacea, Calcutta, 1901, p. 98.

Stat. 95. June 26. 5°43′.5 N., 119°40′ E. Sulu Sea. 522 m. Stony bottom. 1 male.
Stat. 105. July 4. 6°8′ N., 121°19′ E. Sulu Sea. 275 m. Coralbottom. 1 adult egg-laden female.
Stat. 253. Dec. 10. 5°48′.2 S., 132°13′ E. West of Kei-islands. 304 m. Bottom grey clay, hard and crumbly. 1 male.

Unfortunately in the adult female (Fig. 27) the rostrum is broken off near the distal extremity of the antennular peduncle. The very low dorsal crest commences nearly at the anterior third of the carapace, which, posterior to it, is rounded and which is 10 mm. long; the 1st tooth, which is very small and the smallest of all, stands at one-fourth the length of the carapace from its orbital margin, the four following slightly increase in length and are all placed on the carapace: the four first teeth seem to be movable. The 6th tooth is much larger than the carapacial teeth and stands above the orbital margin, the three following are of the same size as the 6th, near the 9th the rostrum is broken off. The carapace of the male (Fig. 27*c*) is 7,5 mm. long, the rostrum 10 mm., when measured in a straight line from the orbital margin to the apex, almost one and a half the length of the carapace; from the orbital margin the rostrum runs horizontally forward as far as the distal extremity of the antennular peduncle and from here it is a little and obliquely turned upward; the rostrum is not widened at base and tapers regularly to the pointed apex. Like in the female there are 5 movable teeth on the carapace, closely set, of which the 1st is the smallest, the 2nd twice as long as the 1st, while the three following slightly increase in length; the 6th tooth, fixed like the following and placed above the orbital margin, is comparatively smaller than in the full-grown female and but little larger than the 5th movable tooth. The 6th tooth is followed by four teeth of equal size, of which the anterior stands near the distal extremity of the antennular peduncle; from here to the apex four smaller teeth occur, that gradually diminish in size anteriorly, while also the distances between these teeth become gradually smaller. The lower margin is armed with 6 teeth, the 1st at the far end of the antennular peduncle, while the distances between them slightly diminish in length.

Antennal spine small, not yet reaching to the anterior margin of the 2nd joint of the antennal peduncle, branchiostegal spine minute.

Abdomen nearly 4-times as long as the carapace. Posterior margin of 3rd tergum moderately produced. Sixth somite almost twice as long as 5th: in the full-grown female the 6th somite is 7,4 mm. long, the 5th 4 mm., in the male these numbers are 5,4 mm. and 2,5 mm.; in the female the telson without terminal movable spines is 7,7 mm. long, in the male 5,7 mm., appearing slightly longer than the 6th somite. The telson has 3 pairs of side spines above, it is as long as the inner uropod, but shorter than the outer.

The eyes are described by Miss Rathbun as considerably larger than those of a species which she is inclined to refer to *Ples. ocellus*, in the present specimens they are, however, of a moderate size; in those of the female (Fig. 27*a*) the transverse diameter (2,8 mm.) is little more than one-fourth the length of the carapace and this diameter is slightly longer than the axial. Ocellus also of moderate size, broadly in contact anteriorly with a process from the cornea dipping towards it.

Antennular peduncle reaching to the middle of the antennal scale; 3rd joint a little longer than 2nd, stylocerite pointed, as long as basal article, flagella subequal, the longer nearly as

long as carapace and abdomen combined. Antennal peduncle a little longer than the basal joint of that of the upper antennae, scaphocerite (Fig. 27*b*) almost as long as the carapace (in the female 9 mm. long), slightly more than 4-times as long as wide, distinctly narrowing anteriorly, outer margin slightly concave proximally, terminal spine distinctly reaching beyond the truncate tip of the lamella.

The external maxillipeds reach by their terminal joint and one-fourth of the penultimate beyond the antennal scale; exopodite small, not yet reaching to the middle of the antepenultimate joint.

The peraeopods of the 1st pair reach by four-fifths their terminal joint (or propodus) beyond the external maxillipeds; the penultimate joint or carpus is almost twice as long as the terminal, these joints being respectively 9,1 mm. and 5 mm. long in the adult female; a microscopical chela seems to be present.

The slender legs of the 2nd pair are equal and reach by the chela and two-fifths of the carpus beyond the antennal scale, while the merus extends to the far end of the antennal peduncle; in the adult female the carpus, which is composed of 19 or 20 segments, is 9,8 mm. long, as long as the carapace, and the chela, the fingers of which have the same length as the palm, is 1,6 mm. long, one-sixth of the carpus.

In the adult female the legs of the 3rd pair reach by the dactylus, the propodus, the carpus and one-fifth of the merus beyond the antennal scale, the merus of the 4th pair reaches almost to the distal extremity of the antennal scale and the legs of the 5th pair reach by the dactylus, the propodus and four-fifths of the carpus beyond the scaphocerite. At the right side the 4th and the 5th legs are complete, but in those of the 3rd pair the propodus and the dactylus are wanting; on the left side the 3rd leg is wanting and the dactylus of the 5th. The meri diminish regularly in length from the 3rd to the 5th and those of the 3rd pair are distinctly thicker than the meri of the 4th and 5th; the meri are spinose, like in the allied species, but the number of spines is small. The same regularity does not exist in the carpi, for the carpus of the 4th leg is distinctly shorter than that of the 3rd, but the carpus of the 5th pair is longer than that of the preceding leg. The propodi, however, probably increase regularly in length, for those of the 5th pair are longer than the propodi of the 4th and in the allied *Ples. ocellus* (Bate) the propodus of the 3rd pair is shorter than that of the 4th. The dactyli are very short, measuring in the 4th pair (Fig. 27*c*) about $^1/_{11}$, in the 5th (Fig. 27*d*) $^1/_{15}$ the length of the propodi; they are of a stout shape, 5-times as long as broad at base both in the 4th and in the 5th pair, and their posterior margin is unarmed, without spinules, except one or two near the tip. In the adult, full-grown female the carpus of the right 4th leg is 12,3 mm. long, the propodus 11,3 mm., the dactylus 1 mm., for the left leg these numbers are in the same succession 10,7 mm., 10,4 mm. and 1 mm.; the carpus of the right 5th leg is 12,8 mm. long, the propodus 13,6 mm., the dactylus 0,9 mm., in the left leg these numbers are in the same succession 12,75 mm. and 13 mm. (the dactylus is lost). Attention may also be called to the fact that the measurements of carpus and propodus differ rather much in the two legs of the 4th pair. In the male, which is much smaller, the three posterior legs are lost.

The male from Stat. 95 has nearly the same size as that from Stat. 253. The extreme

tip of the rostrum is broken off, it reaches still a little beyond the antennal scale; there are proximally 4 movable teeth that slightly increase in length from the 1st to the 4th, the 5th tooth stands above the orbital margin and is followed by five that become gradually smaller, while one observes after a short distance still 3 much smaller teeth, which also diminish in size. There are 7 teeth on the lower margin, the 1st near the distal end of the antennular peduncle, and these teeth become also gradually smaller. The left leg of the 2nd pair that reaches by the chela and two-fifths of the carpus beyond the antennal scale, is a little longer than the right, of which only the chela extends beyond the scale; the carpus of the left leg is 7 mm., that of the right 6 mm. long. The three posterior legs are very incomplete.

The male from Stat. 253 is (Fig. 27*c*) 45,5 mm. long (rostrum 10 mm., carapace 7,5 mm., abdomen 28 mm.) from apex of rostrum to tip of telson, the much larger female 48 mm. from orbital margin to tip of telson (carapace 10 mm., abdomen 38 mm.); the male from Stat. 95, finally, measures 42 mm. (rostrum probably 8,6 mm., carapace 7,4 mm., abdomen 26 mm.).

General distribution: Hawaiian Islands (Rathbun).

5. *Plesionika unidens* Bate. Pl. XI and XII, Fig. 28—28*b*.

Plesionika unidens C. Spence Bate, Report Challenger Macrura, 1888, p. 648, Pl. CXIII, fig. 4.
Plesionika affinis A. R. S. Anderson, in: Annals Mag. Nat. Hist. Ser. 7, Vol. III, 1899, p. 285 (teste A. Alcock).
Pandalus (Plesionika) unidens A. Alcock, Descr. Catal. Indian Deep-Sea Crustacea. Calcutta 1901, p. 97.

Stat. 12. March 14. 7° 15′ S., 115° 15′.6 E. Bali Sea. 289 m. Bottom mud and broken shells. 1 adult, egg-laden female.
Stat. 65a. May 6. Very near Station 65 (7° 0′ S., 120° 34′.5 E.). From 400 m. Bottom pale, grey mud, changing during haul into coral bottom. 1 adult, egg-laden female.
Stat. 253. Dec. 10. 5° 48′.2 S., 132° 13′ E. West of Kei-islands. 304 m. Bottom grey clay, hard and crumbly. 1 specimen of medium size, without eggs, probably female.

Plesionika unidens Bate differs from all the other species of this genus by the characteristic carination (Fig. 28*b*) of the 3rd abdominal tergum, which is compressed and carinated dorsally in the middle, the carina ending abruptly, like a tooth, nearly at the posterior fourth, while at the anterior fourth it gradually passes into the surface of the tergum. This species is moreover distinguished by the existence of a solitary tooth on the upper border of the rostrum, somewhat behind the apex, while the rest is smooth until near the base. Unfortunately in the female from Stat. 65a the rostrum is broken off at the level of the distal extremity of the antennular peduncle, while in the two other specimens the rostrum is also broken off near the tip, so that the solitary tooth is wanting. Nevertheless these specimens should, no doubt, be referred to *Ples. unidens* Bate, because in the other characters they apparently agree with this species.

Measured dorsally, the carapace of the female from Stat. 12 (Fig. 28*a*) proves to be 13,3 mm. long, the rostrum, as far as preserved, 22,5 mm. According to Spence Bate the rostrum should be twice as long as the carapace, but in the figure 4 on Plate CXIII of his work it appears almost 3-times as long. Assuming the same relative length for the rostrum of the female from Stat. 12, the rostrum has been 37 mm. long in this specimen and the distance between the

solitary tooth and the orbital margin 25 mm.: the preserved part is, however, only 22,5 mm. long, we may therefore conclude that the tooth has stood on that part which is broken off. The obtuse rostral carina gradually rises just before the middle of the carapace, but the 1st tooth stands at the anterior ninth of the latter; this tooth is the smallest of all, the 2nd and the 3rd, that is placed above the orbital margin, gradually increase in size, but the three remaining teeth, on the rostrum proper, have the same size as the 3rd; these teeth are, however, much farther distant from one another than the three proximal and stand at equal distances, two above the eyes, the 3rd at the level of the distal extremity of the 2nd antennular article; the rest of the upper margin is smooth. At first the rostrum curves downward to the level of the distal extremity of the antennular peduncle; from here it runs straight and obliquely upward to above the level of the upper border of the carapace. The lower margin bears in this specimen 15 teeth, of which the 1st is placed opposite the middle of the 3rd antennular article, just in front of the anterior tooth of the upper margin; the first 8 or 9 teeth stand rather closely together, but the distances between the following gradually increase in length. According to BATE the lower margin should be furnished with 6 or 7 teeth, but in the figure 4 it bears distinctly 10 teeth: the larger number of teeth on the lower margin shall therefore probably prove to be of no importance. Antennal spine rather long, reaching beyond the 2nd joint of the antennal peduncle, branchiostegal spine very small, minute. In this specimen the 6th somite is just twice as long as the 5th; the telson is but little, viz. $^1/_8$, longer than the 6th somite; it is armed with 3 pairs of dorso-lateral spinules besides those at the tip and is as long as the inner uropod, when the longer terminal spines, that are of moderate length, are included, but distinctly shorter than the exopodite of the tail-fan.

In the specimen from Stat. 253 the carapace is 11,25 mm. long, while the preserved part of the rostrum measures only 14 mm. The proximal teeth of the dorsal border agree with those of the preceding specimen, but there are 7 teeth instead of 6, the anterior tooth standing just beyond the tip of the antennular peduncle; 13 teeth occur on the lower margin. The carapace of the female from Stat. 65a is almost 12 mm. long.

Eyes large, reniform, being in the adult female from Stat. 12 4,2 mm. broad and 3,4 mm. long; ocellus large, elliptical, only in contact with the cornea at its distal extremity. BATE describes the first joint of the antennular peduncle as short, it is, however, on the contrary rather long, appearing, when measured from the orbital margin, more than twice as long as the 2nd and 3rd, that are subequal, combined; the peduncle extends a little beyond the middle of the antennal scale, stylocerite as long as 1st article.

Spine at the outer distal angle of 2nd joint of antennal peduncle small, reaching as far forward as the antennal spine of the carapace. Scaphocerite in the adult female from Stat. 12 10,75 mm. long, i. e. $^7/_9$ the length of the carapace; it has a narrow shape, is about 4-times as long as wide and tapers distinctly towards the tip; outer margin slightly concave, terminal spine hardly reaching beyond the tip of the lamella. Antennal peduncle a little shorter than 1st joint of antennular peduncle.

The external maxillipeds reach by half their terminal joint beyond the antennal scale; exopodite well developed, half as long as the antepenultimate joint.

The legs of the 1st pair, almost as long as the external maxillipeds, extend by half their terminal joint or a little more beyond the antennal scale, terminal joint or propodus, in the female from Stat. 12, almost half as long as the carpus.

The female from Stat. 65a (Fig. 28) is the only specimen in which both legs of the 2nd pair are still preserved. These legs are very unequal, the left being the more slender and longer one. The left leg is 49 mm. long, nearly as long as the distance (51 mm.) between the orbital margin and the tip of the telson, the ischium reaches to the distal extremity of the antennal peduncle, while this very thin and filiform leg projects by the chela, the carpus and almost half the merus beyond the antennal scale; the carpus, 23,7 mm. long and multiarticulate, is half as long as the whole length of this leg, the chela is very small, minute, 0,9 mm. long, only $^1/_{26}$ the length of the carpus, while the fingers are just as long as the palm. The right leg, 22 mm. long, is nearly half as long as its fellow and reaches only by the chela beyond the antennal scale, while the merus extends to the middle of the antennal peduncle; the multiarticulate carpus is 8,5 mm. long and the chela (2,08 mm.), the palm of which is one and a half as long as the fingers, measures one-fourth of the carpus. In the somewhat larger female from Stat. 12 the shorter right leg reaches by the chela and one-fourth of the carpus beyond the antennal scale. The legs of the 3rd pair reach in the female from Stat. 65a by the dactylus and almost half the propodus beyond the antennal scale, the merus extending to the far end of the antennal peduncle, the following legs gradually diminish a little in length, so that those of the 5th pair reach only by the dactylus beyond the scale. The propodus of these legs is one-fourth longer than the carpus, while the dactyli measure about one-third of the propodi.

The external maxillipeds and the legs, except those of the 5th pair, are furnished with well-developed, though rather small epipodites.

Eggs numerous, small, 0,5 mm. long.

The female from Stat. 12 is 58 mm. long from the orbital margin to tip of telson, the abdomen about 3-times as long as the carapace.

This species bears some resemblance to *Ples. heterocarpus* Costa, of which three adult specimens from the Gulf of Naples are lying before me. The general form of body and legs is much the same and the 3rd abdominal tergum is also carinate in the middle, but this carina is broader, not compressed, but rounded both transversely and longitudinally and does not terminate posteriorly in a tooth, while it extends almost to the posterior margin; the rostrum is denticulate dorsally along its whole length and the dactyli of the three posterior legs are longer.

General distribution: North of New Guinea (Bate); Andaman Sea (Alcock).

6. *Plesionika assimilis* de Man. Pl. XI and XII, Fig. 29—29*g*.

Plesionika assimilis J. G. de Man, in: Zoologische Mededeelingen, uitgegeven vanwege 's Rijks Museum van Natuurlijke Historie te Leiden, Dl. III, Afl. 4, 1917, p. 280.

Stat. 51. April 19. Madura-bay and other localities in the southern part of Molo-strait. 54—90 m. Bottom fine grey sand; coarse sand with shells. 3 males, 8 females, 7 of which are egg-laden, and 1 young specimen.

A new species, closely allied to *Ples. rostricrescentis* (Bate), *Ples. binoculus* (Bate) and

Ples. exigua (Rathb.). It is a species of a rather small size, the largest specimen, an ova-bearing female, being 52 or 53 mm. long from apex of rostrum to tip of telson; the carapace of this female is 9,2 mm. long, the rostrum, measured in a straight line from the orbital margin to the apex, 14,6 mm. and the abdomen nearly 29 mm. In its outer appearance this species (Fig. 29) much resembles *Ples. binoculus* (Bate), the rostrum being as strongly upturned and the abdomen being bent at a right angle at the third abdominal segment. In the adult full-grown species the rostrum is about one and two-thirds to one and three-fourths as long as the carapace, when the rostrum is measured in a straight line from the orbital margin to the apex; in the younger individuals it is almost twice as long as the carapace, in the youngest male the carapace measures 5 mm., the rostrum 9,5 mm. and in the young specimen these numbers are respectively 4 mm. and 7,6 mm. The dorsal crest (Fig. 29*a*) begins about at the anterior third of the carapace, but, while in *Ples. binoculus* this crest is high and elevated, in *Ples. assimilis* it is very low and while, according to Miss RATHBUN's description, the rostrum of *Ples. exigua* is curved strongly downward in front of the eyes, in this new species the frontal crest is very little deflexed and runs almost horizontally forward as far as the distal extremity of the 2nd antennular article; from here it is strongly curved upward. The rostrum is slender, not widened at base and tapers regularly to the tip. Like in *Ples. rostricrescentis* and *Ples. binoculus* the first five teeth of the dorsal crest are movable, except only in one ova-bearing female, in which there are four and in this female the 4 movable teeth stand all on the carapace. In the other specimens the 5th tooth stands above the orbital margin or just before it. The movable teeth gradually increase in length and are followed by 2 or 3 fixed teeth; the 6th tooth is a little larger than the 5th, the 7th as large as the 6th, the 8th a little smaller; these 2 or 3 fixed teeth stand between the orbital margin and the distal extremity of the antennular peduncle, at unequal distances. In front of the tip of the antennular peduncle a more or less long part of the upper border is smooth and unarmed, nearly as in *Ples. rostricrescentis*, while 3 or 4, rarely 2, teeth, also fixed, stand near the tip at unequal distances; so e. g. in the youngest male of the 4 distal teeth two stand close to the tip, the anterior as far from the penultimate as from the apex of the rostrum, the penultimate as far from the apex of the rostrum as from the 3rd or antepenultimate tooth, while the 4th is twice as far distant from the antepenultimate as the latter from the tip of the rostrum; in the largest specimen, an egg-laden female, there are also 4 distal teeth, but the posterior or 4th is as far distant from the 3rd as the 3rd from the extremity of the rostrum. The lower margin is usually armed with 11, more rarely with 10 or 12 teeth; the 1st stands near the far end of basal antennular article, while 3 or 4 distal teeth stand often at somewhat larger distances than the preceding and the foremost tooth is placed a little distant from the tip of the rostrum.

Antennal spine small, reaching to the anterior margin of the 2nd joint of the antennal peduncle, branchiostegal spine much smaller, minute. Abdomen, telson included, about 3-times as long as the carapace and one-fourth longer than carapace and rostrum combined. Third abdominal tergum slightly compressed, its posterior margin a little convex. Sixth abdominal somite in the adult female nearly once and a half as long (4,4 mm.) as 5th (2,7 mm.). Telson (6,3 mm.) almost as long as the 5th and the 6th somite taken together and one and a half as long

as the 6th somite; it is armed with 3 pairs of side spines, subterminal spinules at the tip, the longest, of moderate length, measuring about one-sixth the length of the telson. In younger specimens the 6th somite is almost twice as long as the 5th and the telson appears relatively a little shorter, so in the youngest male the 5th and the 6th somite and the telson are respectively 1,4 mm., 2,6 mm. and 3,5 mm. long. Telson a little shorter than the inner uropods, that are slightly shorter than the outer.

Eyes (Fig. 29*b*) of moderate size, transverse diameter as long or slightly longer than axial; ocellus large, elliptical, at its anterior extremity in contact with the cornea.

Antennular peduncle reaching to the middle of the antennal scale, 2nd and 3rd joint subequal, together shorter than basal article; stylocerite acuminate, reaching to the middle of 2ntd article. Antennular flagella subequal, reaching beyond the rostrum as far as the latter is long.

Antennal scale (Fig. 29*c*) nearly one-fifth shorter than the carapace, measuring 6,5 mm. in an egg-bearing female, the carapace of which is 8 mm. long; the scale is 4,4-times as long as wide and narrows distinctly anteriorly, being at the base of the terminal spine little more than half as broad as at the greatest width; tip of terminal spine in line with the rounded end of the lamella. Antennal peduncle almost as long as that of the upper antennae.

External maxillipeds furnished with a well-developed exopodite and projecting by two-fifths their terminal joint beyond the antennal scale. Legs of the 1st pair as long as the external maxillipeds, terminal joint (propodus) (Fig. 29*d*, 29*e*) measuring nearly two-thirds the penultimate and with a minute chela at the end, that measures $^1/_{11}$ the length of the joint. The legs of the 2nd pair are very unequal, the left leg being the longer and more slender one. The left leg (Fig. 29*f*) reaches by the chela, the multiarticulate carpus and one-sixth of the merus beyond the antennal scale, the right only by the chela and one-fourth of the carpus; the fingers of the very small chela of the left leg are as long as the palm and, as in *Ples. binoculus*, the merus and the anterior half of the ischium are also distinctly annulate; the fingers of the larger chela of the right leg are shorter, measuring only two-thirds the length of the palm and the merus shows also an annulation, which, however, is rather indistinct. The legs of the 3rd pair reach by the dactyli and four-fifths of the propodi beyond the antennal scale, the following diminish slightly in length, so that the legs of the 5th pair exceed the scale only by the dactylus and one-third of the propodus. The propodi of the three posterior legs are one and a half as long as the carpi; the dactyli (Fig. 29*g*) are short, measuring hardly more than one-fifth of the propodi; they are of a stout shape, only 5-times as long as broad at base and provided along the proximal half of their posterior margin with 4 or 5 spinules that gradually increase in length, the distal longest one measuring one-sixth the length of the dactylus. All the peraeopods, except the last pair, are furnished with well-developed epipodites.

Eggs numerous, small, 0,4—0,5 mm. long. Length of ova-bearing female 52 or 53 mm.

Ples. rostricrescentis (Bate) from the Kei-islands differs by its much larger size, by the frontal crest being more strongly curved and more depressed, so that the rostrum presents a characteristic crescentic shape, by the circular form of the ocellus and by the stylocerite reaching to the distal extremity of the antennular peduncle.

Ples. exigua (Rathb.) from the Hawaiian Islands may be distinguished by the rostrum bent strongly downward in front of the eyes, by the abdomen being nearly 4-times as long as the carapace, by the axial diameter of the eyes exceeding the transverse and by its very small size.

Ples. binoculus (Bate), finally, differs by a larger size, by the frontal crest being higher and more elevated, by the proximal teeth of the upper margin of the rostrum being not separated by a long smooth interspace from the distal teeth and by the much longer and slenderer dactyli of the three posterior legs, that measure one-third of the propodi.

7. *Plesionika binoculus* (Bate). Pl. XII, Fig. 30.

Nothocaris binoculus C. Spence Bate, Report Challenger Macrura, 1888, p. 656, Pl. CXIV, fig. 2.

Stat. 302. Febr. 2. 10° 27'.9 S., 123° 28'.7 E. Strait between the islands of Rotti and Timor. 216 m. Bottom sand and coral sand. 1 male of medium size.

Stat. 306. Febr. 8. 8° 27' S., 122° 54'.5 E. Lobetobi Strait between the islands of Flores and Solor. 247 m. Bottom sandy mud. 1 male and 3 females, 2 of which are egg-laden.

The five specimens are in a good condition and, except the male from Stat. 302, all of a larger size than those collected by the "Challenger".

The largest specimen (Fig. 30) is an egg-laden female from Stat. 306, in which, measured dorsally, the carapace is 20 mm. long, the abdomen, telson included, 54,5 mm. and the rostrum 28,5 mm., while the latter proves to be 30,5 mm. long, when measured in a straight line from the orbital margin to the apex: the entire length from apex of rostrum to tip of telson is thus 105 mm. The frontal crest, that rises rather suddenly from the middle of the carapace, is much more elevated and higher than in the figure 2 of BATE's work; this is also the case in the other specimens, even in the young male from Stat. 302, the carapace of which is 11,5 mm. long, so that the figure is certainly inaccurate in this respect. The frontal crest that ascends obliquely from the middle of the carapace, makes in all the specimens an obtuse angle with the rounded posterior half of the latter, but in BATE's figure this is not the case. The rostrum curves at first downward to the level of 3rd antennular article and beyond this point gradually rises obliquely upward: in the male from Stat. 306 the rostrum appears as much upturned as in BATE's figure 2, but in the four other specimens it is more strongly upturned. In the two male specimens and in the female without eggs the rostrum is armed dorsally with 13, ventrally with 16 teeth; the first 5 teeth, that gradually increase in size and that are movable, stand on the frontal crest, posterior to the orbital margin; the following teeth are all fixed, the 6th, the largest of all the teeth, stands above the orbital margin and is immediately followed by the 7th which is distinctly smaller, though both the 6th and the 7th are much larger than the following teeth on the upper margin; in the female without eggs the 8th tooth, which is but a little smaller than the 7th, though larger than the following, stands just before the eyes, but in the two males the 8th tooth is already as small as the following and placed at the level of the boundary between the 2nd and 3rd antennular article; the following teeth are subequally distant from each other, except the two foremost teeth that stand close together, the anterior as far from the apex of the rostrum as from the posterior. The largest specimen, the female with

eggs, resembles, as regards the toothing, the male from Stat. 306, but there are not 4, but only 3 small teeth on the upper margin between the 2nd fixed tooth and the two approximate distal teeth, while there are 18 teeth on the lower; the rostral formula is thus $1\frac{5}{18}$. The other egg-bearing female differs from the other specimens by the presence of 6, instead of 5, movable teeth on the frontal crest, so that the first fixed tooth, the largest of all and placed above the orbital margin, is the 7th, instead of the 6th, and furthermore by the lower margin being armed with 15 teeth: the toothing-formula of this female is thus $1\frac{6}{15}$. In the specimens, collected by the "Challenger", the movable teeth of the frontal crest were 4 or 5 in number; of the two first fixed teeth the anterior is described as the larger, while in the "Siboga" specimens the anterior is the smaller: in BATE's figure 2rc, however, the anterior tooth appears not larger than the posterior. As regards the teeth of the lower margin, it should be remarked that the 1st is placed at the far end of basal antennular article, that the teeth, placed at the level of the distal extremity of the antennal scale, are more closely-set than the proximal ones and that beyond the antennal scale the distances between the ventral teeth gradually increase.

Antennal spine small, not reaching beyond the 2nd joint of antennal peduncle, branchiostegal spine much smaller.

Posterior border of 3rd abdominal somite moderately produced. In the large ova-bearing female the 5th somite is 5,5 mm. long, the 6th 8,5 mm., nearly one and a half as long as the 5th and one and a half as long as high in a lateral view. Telson in this female as long as 5th and 6th somite combined and as long as the outer uropods, in the other specimens the telson is a little shorter than the two preceding somites taken together and even a little shorter than the inner uropods.

The eyes resemble the figure 2*a* of the Challenger Report.

The antennular peduncle reaches to the middle of the antennal scale, 2nd and 3rd joint subequal; stylocerite reaching, in the largest specimen, the ova-bearing female, to the middle of 2nd joint, flagella subequal, the longer nearly half as long as the body, rostrum included. Antennal scale about half as long as the rostrum and four-fifths the length of the carapace, measured dorsally; it is 4-times as long as wide and distinctly narrows distally, the outer margin is slightly convex anteriorly and the small terminal spine is much shorter than the obtuse tip of the lamella. Antennal flagellum a little longer than the body, rostrum included.

The external maxillipeds which are provided with a small epipodite and with a well-developed exopodite, extend by four-fifths their terminal joint beyond the antennal scale.

The peraeopods of the 1st pair are, in the large female, hardly (only one millimeter) shorter than the external maxillipeds and reach by a little more than their terminal joint beyond the antennal scale; terminal joint (or propodus) slightly more than half as long as the carpus, terminating in a minute chela, that measures $^1/_{15}$ the length of the terminal joint. According to SPENCE BATE the carpus of the 1st pair should be on the right side longer than on the left, in the five present specimens the two legs are equal.

The peraeopods of the 2nd pair are very unequal and in all the specimens the left leg is the more slender and longer one; in BATE's Report, however, the appendage on the left side is described as the shorter and more robust one. In the egg-laden female, long

105 mm., the left leg measures 122 mm., being one-sixth longer than the body; the ischium reaches to the far end of the antennal peduncle and this leg reaches by the chela, the carpus and three-fourths of the merus beyond the antennal scale; the carpus, which is 58,5 mm. long, measures half the length of the leg; the chela, the fingers of which are a little shorter than the palm, is 2,86 mm. long, $^1/_{43}$ the length of the leg. In this leg also the merus is multi-articulate and even the distal half of the ischium. The right leg is 65 mm. long, about half the length of its fellow, and it reaches by the chela and almost the whole carpus beyond the antennal scale, while the merus extends by half its length beyond the antennal peduncle; the chela (4,8 mm.), in which the fingers are a little shorter than the palm, measures about $^1/_{11}$ the length of this leg and is a little more than one and a half as long as the chela of the other leg; in this leg the merus shows also numerous annulations, that are less obvious than those of the carpus.

In the full-grown female the legs of the 3rd pair reach by the dactylus and the propodus beyond the antennal scale, the following legs slightly diminish in length, so that those of the 5th pair reach only by the dactylus and two-thirds of the propodus beyond the scale. The propodi are considerably longer than the carpi, those of the 3rd pair are just one and two-thirds as long, while the propodi of the 5th pair are one and four-fifths as long as the carpi; the slightly curved dactyli that bear 4 or 5 spinules at the base of their posterior margin, are rather long, measuring one-third of the propodi.

General distribution: Arafura Sea, south of New Guinea.

8. *Plesionika bifurca* Alcock & Anderson. Pl. XII, Fig. 31—31*b*.

Plesionika bifurca A. Alcock & A. R. Anderson, Journ. Asiat. Soc. Bengal, Vol. LXIII, pt. 2, 1894, p. 155.

Pandalus (Plesionika) bifurca A. Alcock, Descr. Catal. Indian Deep-Sea Crustacea, Calcutta 1901, p. 98.

Illustrations of the Zoology of the Investigator, Crustacea, Pl. LI, Fig. 6.

Stat. 5. March 10. 7°46 S., 114°30'.5 E. Bali Sea. 330 m. Bottom mud. 1 young specimen.
Stat. 38. April 1. 7°35'.4 S., 117°28'.6 E. Bali-Sea. 521 m. Bottom coral. 1 adult male.
Stat. 45. April 6. 7°24' S., 118°15'.2 E. North off Sumbawa. 794 m. Bottom fine grey mud, with some radiolariae and diatomes. 2 ova-bearing females, 1 male and 1 young specimen.
Stat. 178. Sept. 2. 2°40' S., 128°37'.5 E. Ceram Sea. 835 m. Bottom blue mud. 7 young and medium-sized specimens, among which 1 ova-bearing female.
Stat. 212. Sept. 26. 5°54'.5 S., 120°19'.2 E. West of Saleyer. 462 m. Bottom fine grey and green mud. 1 adult male.
Stat. 262. Dec. 18. 5°53'.8 S., 132°48'.8 E. Kei-islands. 560 m. Bottom solid bluish grey mud, upper layer more liquid and brown mud. 1 young male and 1 ova-bearing female.
Stat. 314. Febr. 17, 1900. 7°36' S., 117°30'.8 E. North of Sumbawa. 694 m. Bottom fine, sandy mud. 4 adult females, 3 of which are ova-bearing, and 2 young specimens.
Stat. 316. Febr. 19, 1900. 7°19'.4 S., 116°49'.5 E. Bali Sea. 538 m. Bottom fine, dark brown sandy mud. 9 full-grown egg-laden females and 2 young specimens.

Though all these 31 specimens certainly belong to the above-mentioned species, they differ from the figure 6 of the "Illustrations" by the rostrum (Fig. 31) being more acuminate,

more strongly curved upwards and projecting nearly always a little beyond the antennal scales. In the first description of 1894 the carapace is described as being "dorsally carinated in rather more than its outer half", i.e. its anterior half; this is indeed often the case in these specimens, the 1st tooth, i.e. the dorsal carina, commencing just behind the middle of the carapace, while in the figure of the "Illustrations" this tooth stands a little more forward. According to Prof. ALCOCK's description of 1901 the dorsal serrations of the rostrum are 8 or 9 in number, the ventral from 3 to 5. Among twenty seven specimens, in which the rostrum is well-preserved, in sixteen the dorsal serrations number 7, in seven 8, in six 3 and in the young specimen from Stat. 5, which is the youngest of all and 22 mm. long from apex of rostrum to end of telson, even 9 teeth are observed; in this young specimen the 1st tooth stands a little anterior to the middle of the carapace, while the distance between the foremost tooth and the tip of the rostrum measures almost one-third the length of the rostrum proper. While in the species living on the coasts of India the usual number of dorsal teeth is 8 or 9, in the form, occurring in the Indian Archipelago, it is usually 7, more rarely 8, while 6 teeth are observed rather exceptionally. Almost constantly four teeth stand on the carapace behind the limit of the orbit: in an ova-bearing female from Stat. 316 only 3 teeth stand on the carapace, the 4th just before the orbital margin and the same is observed in one of the two young individuals collected at this Station. Ventrally the rostrum is armed in these specimens with 4—7 teeth, the usual number being 5; in an adult female without eggs from Stat. 314, in which the carapace is 13,5 mm. long and the rostrum, measured horizontally, 12,5 mm., only 3 well-developed teeth occur on the posterior half of the margin, of which the 2nd stands just before the anterior of the 6 teeth of the upper border and the 3rd opposite the apex of the antennal scale; one observes, however, a 4th rudimentary tooth not far from the extremity. The rostrum of the egg-laden female from Stat. 262 is $\frac{8}{8}$-dentate, the 5th tooth of the lower margin is the largest of all and the three following rapidly decrease in size; there is still another specimen with 8 teeth on the lower margin, namely an ova-bearing female from Stat. 314, but the anterior tooth is rudimentary. For the rest in most specimens one or two anterior teeth of the lower margin are rudimentary.

In the young specimens from the Ceram Sea the 1st dorsal tooth stands on the middle of the carapace. This is also the case in the adult male from Stat. 212; the rostrum is here $\frac{8}{6}$-dentate, less strongly upcurved than in the other specimens, but reaching beyond the antennal scales. In the specimens from the Stations 262, 314 and 316 the dorsal carina extends to behind the middle of the carapace.

In an adult, egg-laden female from Stat. 316, in which the carapace is 14,5 mm. long, the left leg of the 2nd pair reaches by the chela and three-fifths of the carpus beyond the antennal scale; the right leg of this pair extends nearly as far forward, but the less slender carpus is one-third shorter than the carpus of its fellow. The leg of the 3rd pair is the longest of all and reaches still a little beyond those of the 2nd pair, projecting by the dactylus, the propodus and half the carpus beyond the antennal scale. The 4th and the 5th gradually decrease in length, so that the 5th legs reach only by the dactylus and three-fifths of the propodus beyond the antennal scale.

Of one of the largest egg-laden females from Stat. 316 the carapace is 15 mm. long, the rostrum, measured horizontally, 11 mm., the abdomen 36,5 mm., the entire length 62,5 mm.; when measured in a straight line from its base to the apex, the rostrum proves to be 13 mm. long.

Ova very numerous, oval, 0,54—0,56 mm. long, 0,4—0,42 mm. broad.

General distribution: Arabian Sea (Alcock); Bay of Bengal (Alcock); Andaman Sea (Alcock).

Parapandalus Borr.

The genus *Parapandalus* Borr., closely related to *Plesionika* Bate, but distinguished by the want of epipodites on the thoracic legs and by the different appearance and toothing, at least in most species, of the rostrum, includes at present about a dozen species, though it should be remarked that of four species, *Parap. escatilis* Stimps., *longicauda* Rathb., *miles* (A. M.-Edw.) and *stylopus* (A. M.-Edw.) it is still unknown whether their peraeopods bear epipodites or not: these species are, however, also included on account of their outer physiognomy. Two, *Parap. pristis* (Risso) and *Parap. Narwal* (Heller), occur in the Mediterranean, the former is known from the coast of Cette, Marseille, Nice, Genoa, Naples, Taranto, Sicily, has also very rarely been observed near the island of Lissa in the Adriatic and has recently been recorded from the Red Sea, where *Parap. pristis* was taken by the "Pola" Expedition at no less than 35 Stations. *Parap. Narwal* (Heller) is known from the west coast of Italy (Genoa, Viareggio, Naples), from Sardinia, Sicily (Palermo), Taranto, it has been captured north of the coast of Tripolis, but was not yet recorded from the Adriatic. *Parap. stylopus* (A. M.-Edw.) has been taken, July 1882, by the "Travailleur", but a list of the Stations of this expedition has never been published, as far as I know.

Two species occur in the eastern Atlantic, near the island of Madeira, *Parap. escatilis* (Stimps.) and *Parap. Richardi* (Cout.), a form with a very long, slender and upturned rostrum, for which Professor Coutière has created the genus *Stylopandalus*. In the West-Indies *Parap. Narwal* is represented by *Parap. miles* (A. M.-Edw.), a closely related form, which was taken by the expedition off the "Blake" off the island of Martinique. The second *Parapandalus*, known from the West-Indies, is *Parap. longicauda* (Rathb.) from Porto Rico. From the east coast of the United States and of South America, like also from the west coast of the New World, no species are recorded.

All the other representatives of this genus are found in the Indopacific. Besides *Parap. pristis* (Risso) still another species occurs in the Red Sea, the long-legged *Parap. Adensameri* Balss. Three are recorded from the Indian Ocean, firstly the little known *Parap. Cottei* [Pfeffer] (Kotte), that was captured by the German Deep-Sea Expedition at Stat. 253, off the Suaheli Coast, German East Africa, a form bearing more resemblance to some species of *Plesionika*, as e. g. *Ples. martia* (A. M.-Edw.), by the toothing and shape of the rostrum than to its other congeners, furthermore *Parap. Zur Strasseni* Balss, taken by the "Valdivia" Expedition east of the Seychelles and south west of Sumatra, and, finally, *Parap. spinipes* (Bate), known from off Cape Comorin. *Parap. spinipes* (Bate) occurs also west of the Kei-islands, near the Kermadec

Islands, north of New Guinea and on the south coast of Japan (Kagoshima, Sagami Bay). Still two other species are found in the Indian Archipelago, viz. *Parap. serratifrons* Borr., numerous specimens of which were obtained by the "Siboga" in Lobetobi Strait and on the north coast of Sumbawa and *Parap. Zur Strasseni* Balss already mentioned, which was captured at four Stations in the northern part of the Banda Sea; the former, with which *Parap. tenuipes* Borr. is no doubt identical and which represents the mediterranean *Parap. pristis* (Risso) in the Indopacific, was first brought by Dr. Willey from Blanche Bay, New Britain and (as *Parap. tenuipes*) from the D'Entrecasteaux Group, British New Guinea.

The species of this genus are found at rather moderate depths, except *Parap. Adensameri*, that was dredged in the Red Sea at 715, though also at 440 fathoms and perhaps also *Parap. Zur Strasseni* Balss. The vertical range of *Parap. pristis* (Risso) is still little known, but, according to Dr. Balss, it occurs in the Gulf of Naples in shallow water between the surface and 110 fathoms; the other mediterranean species, *Parap. Narwal*, was obtained by the "Travailleur" at 87, but by the "Pola" Expedition north of Tripolis at 371 fathoms.

Key to the known species of the genus *Parapandalus* Borr.

a_1 Upper margin of rostrum bearing only 6 teeth proximally, beyond which it is smooth and unarmed, rostrum twice as long as carapace — *Cottei* [Pfeffer] (Kotte)

(E. Kotte, Beiträge zur Kenntniss der Hautsinnesorgane und des peripheren Nervensystems der Tiefsee-Decapoden, in: Zoolog. Jahrb. Abth. f. Anatomie und Ontog. Bd. 17, Jena 1903, p. 619—658, Taf. 23—27 [1]).)

a_2 Upper margin of rostrum armed with two large teeth above the eyes and ten very small ones on the distal half, which are separated from the two proximal teeth by a smooth interspace. Rostrum almost 3-times as long as the carapace. Sixth abdominal somite 3-times as long as 5th . . . . . — *Zur Strasseni* Balss

a_3 Upper margin of rostrum toothed along its whole length.

b_1 Upper margin of rostrum not finely and evenly serrate with small, close-set, imbricate teeth, but the teeth are more or less distant from one another, the distances between their apices of unequal length.

c_1 Sixth abdominal somite one and a half as long as high anteriorly. Penultimate joint of external maxillipeds distinctly longer than the ultimate. The three posterior legs are very long and slender, carpi of 5th pair as long as the propodi . . . . . — *Adensameri* Balss

(H. Balss, Die Decapoden des Roten Meeres. I. Macruren. Wien 1915, p. 18, fig. 17.)

c_2 Sixth abdominal somite at least twice as long as high anteriorly.

d_1 Third abdominal tergum armed posteriorly with a small, slender spine.

1) In this paper some characters, measurements and a figure of this species are given by E. Kotte, who at p. 622 says that it should afterwards be described by Professor Pfeffer: as far as I know, this description has, however, never been published.

Rostrum 3-times as long as carapace, sixth abdominal somite 3-times as long as high . . . . . *Richardi* (Cout.)

(H. COUTIÈRE, in: Bulletin du Musée Océanographique de Monaco, N° 48, 1905, p. 18, Fig. 6, 1—13.)

d_2 Third abdominal tergum unarmed.

e_1 Upper margin of rostrum with 17 teeth, of which the proximal are not considerably larger than the distal . . . . . *miles* (A. M.-Edw.)

(A. MILNE-EDWARDS, Recueil de Figures de Crustacés nouveaux ou peu connus, 1883, Pl. 18.)

e_2 Upper margin of rostrum with 20—38 teeth, of which two or three proximal ones, above the eyes, are considerably larger than the distal ones . . . . . *Narwal* (Heller)

(C. HELLER, Die Crustaceen des südlichen Europa. Wien 1863, p. 245, Taf. VIII, fig. 7, 8.)

b_2 Upper margin of rostrum finely and evenly serrate with small, closely packed, imbricate teeth.

c_1 At the posterior sixth of carapace a small, blunt, median spine. Rostrum twice as long as the carapace, nearly horizontal. Upper margin with about 40 small spines, that are larger posteriorly than anteriorly. Terminal and penultimate joint of external maxillipeds subequal . . . . . *longicauda* (Rathb.)

(M. J. RATHBUN, The Brachyura and Macrura of Porto Rico, Wash. 1901, p. 117, fig. 24.)

c_2 No spine at the posterior sixth of carapace.

d_1 Endopodite of external maxillipeds resembling that of *Pandalus Montagui* Leach, in which species the penultimate joint is shorter than the ultimate.

Rostrum much longer than carapace, upper margin with 60 teeth, the 1st at one-fifth the length of the carapace from the orbital margin. Legs very long and slender . . . . *escatilis* (Stimpson)

(W. STIMPSON, in: Proc. Acad. Nat. Sciences of Philadelphia, 1860, p. 37.)

d_2 Penultimate joint of endopodite of external maxillipeds distinctly longer than ultimate.

e_1 Carpus of 5th leg one and a half as long as the propodus. Dactyli of the three posterior legs long and slender. . . *stylopus* (A. M.-Edw.)

(A. MILNE-EDWARDS, Recueil de Figures de Crustacés nouveaux ou peu connus, 1883, Pl. 19.)

e_2 Carpus of 5th leg shorter than propodus.

f_1 Minimum thickness of 6th abdominal somite, when looked at dorsally, two-fifths the length of this somite, height of 6th somite anteriorly almost five-eighths the length, telson in full-grown specimens almost one and a half as long as 5th somite . . . . . *spinipes* (Bate)

f_2 Minimum thickness of 6th abdominal somite one-fifth the length of this somite, 6th somite twice or a little more than twice as long as broad; telson as long as 6th somite.

g_1 Dactyli of the three posterior legs 11- or 12-times as long as wide at base, terminal claw (stylopodite) one-sixth the whole length of the dactylus, accessory claw one-third of the terminal. . . . . *serratifrons* Borr.

g_2 Dactyli of the three posterior legs 5- or 6-times as long as wide at base, terminal claw (stylopodite) one-third the whole length of the dactylus, accessory claw half as long as the terminal. . . . . *pristis* (Risso)

(C. HELLER, Die Crustaceen des südlichen Europa, Wien 1863, p. 246.)

1. *Parapandalus Zur Strasseni* Balss. Pl. XII, Fig. 32—32*d*.

Parapandalus zur strasseni H. Balss, Zoologischer Anzeiger, Bd. 44, N° 13, 1914, p. 597.

Stat. 185. Sept. 12. 3° 20′ S., 127° 22′.9 E. Manipa-strait. From 1536 m. to surface. 1 male.
Stat. 203. Sept. 19. 3° 32′.5 S., 124° 15′.5 E. Midway between the islands of Celebes and Buru. 2 young females.
Stat. 230. Nov. 14. 3° 58′ S., 128° 20′ E. South of Ambon. From a depth of 2000 m. to surface. 1 young female.
Stat. 243. Dec. 2. 4° 30′.2 S., 129° 25′ E. West of Banda Island. From a depth of 1000 m. to surface. 3 females, one of which is adult.

The specimens, collected by the "Siboga", agree very well with the original description of this species, which was obtained by the "Valdivia" near the Seychelles and near the south-west coast of Sumatra. The male from Stat. 185 is 54,5 mm. long from tip of rostrum to tip of telson, the full-grown female from Stat. 243 66 mm. The slender, thin and tapering rostrum, which in the adult species is 3-times as long as the carapace, runs horizontally forward about to the middle of the antennal scale and is from here rather strongly turned upward: according to the original description, however, it should only be "ein wenig nach aufwärts gebogen". A strong acute tooth is situated on the upper side just above the orbital margin and this tooth reaches to the middle of the corneae, when the eyestalks are directed straight forward: a much smaller tooth is placed immediately behind it. This first or posterior tooth, though being rather of a small size, appears nevertheless larger than the other teeth of the upper margin and therefore no doubt both are described by BALSS as "zwei grössere Zähne". According to this author the other teeth are placed on the distal half of the upper margin, in the present specimens, however, they appear already in the male at the level of the middle of the antennal scale, a little in front of the antennular peduncle, in the full-grown female at the level of the distal third, but the first three or four of the series are very small, so that they may easily be overlooked. In the adult specimens the upper margin is armed, besides with the two larger proximal, with 15 teeth (according to BALSS 10); these teeth are very small, though increasing

a little in size distally, and are situated at unequal distances to near the tip. In the adult species the lower margin is armed with 20—25 teeth, of which the first is situated near the distal third of the antennal scale; these teeth are considerably larger than those of the upper margin, especially the 10 or 12 proximal ones that are approximate, while the following that reach to the tip, are placed at small though subequal distances from one another.

Branchiocardiac groove distinct, not reaching to the posterior margin of the carapace and running obliquely.

Examined under a strong magnifying glass, both carapace and abdomen appear very finely granular. Abdomen, telson included, 4-times as long as carapace. Third abdominal tergum moderately prominent posteriorly. In the adult female the 6th somite (7,75 mm.) is not yet 3-times as long as the 5th (3 mm.), but in the male, in which these numbers are 6,75 mm. and 2,25 mm., it is the case; in the male the 6th somite is 2,5 mm. high proximally, in the female 2,75 mm., the somite appearing in both specimens not yet 3-times as long as high. Telson a little shorter than 6th somite, slightly longer than the endopodite, but distinctly shorter than the exopodite of the caudal fan; there are 4 pairs of dorsolateral spinules, besides those at the tip, the 1st or anterior pair, implanted just before the middle, is as far distant from the 2nd as the 2nd from the 4th or posterior pair.

Spine at the outer angle of the 2nd joint of antennal peduncle rather long; antennal scale long and narrow, tapering, as long as the carapace, measured dorsally, outer margin straight, terminal spine reaching far beyond the truncate tip of the lamella.

Peraeopods according with the original description.

Parap. Zur Strasseni Balss is easily distinguished from the other species of the genus by the shape and armature of the rostrum.

General distribution: 10° 8′ S., 97° 14′ E. (Balss); 3° 24′ S., 58° 38′ E. (Balss).

2. *Parapandalus spinipes* (Bate). Pl. XII and XIII, Fig. 33—33*e*.

Plesionika spinipes C. Spence Bate, Report Challenger Macrura, 1888, p. 646, Pl. CXIII, Fig. 2.
Pandalus (Parapandalus) spinipes A. Alcock, Descr. Catal. Indian Deep-Sea Crustacea, Calcutta, 1901, p. 100.
Plesionika spinipes Bate var. *grandis* F. Doflein, Ostasiatische Decapoden, München, 1902, p. 618, Taf. III, Fig. 3—5.
Parapandalus spinipes (Bate) var. *grandis* H. Balss, Ostasiatische Decapoden II. Die Natantia und Reptantia. München 1914, p. 31.

Stat. 251. Dec. 8. 5° 28′.4 S., 132° 0′.2 E. West of Kei-islands. 204 m. Bottom hard coral sand. 2 adult females, one of which with eggs, and 1 young specimen.

The larger female which is not laden with eggs, is 126 mm. long from apex of rostrum to tip of telson, the other measures 122 mm. and the young specimen 79 mm.; the rostrum of the ova-bearing female, measured from the orbital margin to the apex, is 33 mm. long, the carapace 20,75 mm., the abdomen 68,25 mm., in the two other specimens these numbers are, in the same succession, 36 mm., 21 mm., 69 mm. and 23,75 mm., 13,25 mm., 42 mm. In the two full-grown females the rostrum proves to be one and two-thirds as long as the carapace, in the young specimen almost twice as long, and in the young specimens, collected by the

"Challenger", the rostrum was even a little more than twice as long as the carapace: like in *Acanthephyra* and other genera the rostrum appears the longer the younger the specimens are. The rostrum (Fig. 33*a*) runs at first slightly downward as far as the tip of the antennular peduncle, is from here distinctly bent upwards and runs then straight to the tip; the low gastric crest reaches not yet to the middle of the carapace, gradually fading away. The upper margin is armed in the ova-bearing female with 48, in the two other specimens with 45, forwardly directed teeth that reach to near the tip and that are very closely set, their slightly convex, upper border being nearly contiguous to the slightly concave, lower margin of their predecessors; in the two adult females 5 teeth stand on the carapace, in the young specimen 6, while the 6th, respectively the 7th tooth stands immediately before the orbital margin. The first 5 or 6 teeth gradually increase in size, those that are placed above the basal antennular article, are equal and slightly larger than the following that decrease again in size to the tip; the distance between the 1st tooth and the orbital margin measures one-seventh the length of the carapace. The lower margin is armed in the ova-bearing female and in the young specimen with 27, in the other female with 22 teeth; these teeth are a little smaller than those which are placed on the upper margin above the eyes, the 1st stands near the tip of the antennular peduncle, while the foremost is placed just posterior to the anterior tooth of the upper margin, at 1,5 mm. from the apex of the rostrum. All the teeth both of the upper and lower margin are fixed, but the first two or three, on the carapace, show a rather indistinct articulation.

Posterior margin of 3rd abdominal tergum moderately prominent. In the adult females the 6th abdominal somite (Fig. 33*b*, 33*c*) is $1^1/_2$-times the length of the 5th, in the young specimen the 5th is little more than half as long as the 6th; the height of the 6th somite anteriorly is almost five-eighths, its minimum thickness, when looked at dorsally, two-fifths the length. The telson which in the full-grown specimens is almost one and a half as long as the 6th somite, in the young specimen, however, but one-fourth longer, appears in the adult specimens as long as the endopodite of the caudal fan, but shorter than the exopodite, though the long external, terminal spinules reach as far backward as the exopodite; in the young specimen the telson is a little shorter. There are three pairs of small dorso-lateral spinules on the telson, of which the 2nd pair is twice as far distant from the anterior than from the posterior pair.

Though the small circular ocellus is quite separate from the eye, the pale ring that surrounds it, is for a short distance in contact with the cornea.

The antennular peduncle reaches hardly more than one-third along the antennal scale, 3rd joint of the peduncle a little longer than 2nd, stylocerite acute, as long as basal article; antennular flagella nearly as long as the body, rostrum included.

Antennal scale one-fifth shorter than the carapace, narrow and tapering, terminal spine of outer margin reaching a little beyond the truncate tip of the lamella; flagella one and a half as long as the body, rostrum included.

The external maxillipeds extend by a little more than their terminal joint beyond the scaphocerite and the exopodite reaches about to the middle of the antepenultimate joint.

The legs of the 1st pair, a little longer than the external maxillipeds, project by the

terminal joint and two-fifths of the carpus beyond the antennal scale; the carpus (16 mm. in the ova-bearing female) is a little more than twice as long as the terminal joint and slightly shorter than the merus (17,5 mm.): BATE's description, according to which (l. c. p. 647) the merus should be about half the length of the carpus, is therefore wrong.

The peraeopods of the 2nd pair are perfectly equal and reach, in the ova-bearing female, by the chela and half the terminal joint of the carpus beyond the antennal scale, in the other female by the chela and the three last joints, in the young specimen by the chela and the five last joints of the carpus. The carpus is composed of 19 or 20 articles; terminal article $2^1/_2$-times as long as the penultimate and $2^1/_2$-times as long as broad, chela $1^1/_4$—$1^1/_2$-times as long as the last segment of the carpus and nearly just as broad, fingers about as long as the palm.

In the adult females the legs of the 3rd pair measure two-thirds the length of the body, rostrum included, and reach by the dactylus, propodus and carpus beyond the antennal scale; the following legs slightly increase in length, the 5th leg measuring $^8/_{11}$ the length of the body, but, the length of the meri gradually decreasing, those of the 5th pair reach only along the two proximal fifths of the scaphocerite. The meri of the 3rd pair are armed with 14 or 15 distantly placed spines, those of the 4th with 11 or 12, those of the 5th pair with 7 or 8 spines. The length of the carpi is nearly the same in the legs, but the propodi distinctly increase in length from the 3rd to the 5th, so that those of the 5th pair are about one and a half as long as those of the 3rd. The dactylus is short and, in proportion to the propodi, the length of the dactyli decreases from the 3rd to the 5th leg: those of the 3rd pair (Fig. 33*d*) measure in the full-grown females $^1/_7$ or $^1/_8$ of the propodi, in the young specimen a little less than $^1/_5$, those of the 4th pair in the adult $^1/_{10}$, in the young specimen a little less than $^1/_8$, the dactyli, finally, of the 5th pair (Fig. 33*e*) of peraeopods measure in the adult specimens a little less than $^1/_{12}$ or $^1/_{14}$, in the young specimen $^1/_{12}$ of the propodi. The dactyli are nearly straight and slender, so e. g. are those of the 4th pair of the female with eggs about 7-times as long as broad at base; they taper gradually and are armed near the tip, on their posterior margin, with a short spine that is almost contiguous to the posterior margin and furnished with a few setae at its base, while the margins are for the rest smooth and unarmed.

I at first did hesitate to refer these specimens to *Ples. spinipes*, because in BATE's description "the second pair of pereiopoda is (said to be) unequal, that on the right side being shorter and more slender" (C. SPENCE BATE, l.c. p. 647). As a rule, however, in those species in which the legs of the 2nd pair are unequal, the shorter leg appears also less slender than the other: the right leg, figured in Fig. 2 on Plate CXIII, presents, however, a rather not slender form. In this figure the 1st tooth of the upper margin of the rostrum stands much more backward than in the specimens from Stat. 251 and the rostral teeth are in these specimens not so far distant from one another as in the subjoined figure. I therefore applied to Dr. CALMAN of the British Museum, who with his usual obligingness wrote me the following:

"Of *Plesionika spinipes* all the type-specimens are now more or less broken. The only one that has both rostrum and telson complete has the following dimensions:

Rostrum 25 mm.
Carapace 11,5 mm. } measured to back of orbit.
Pleon 35 mm.

Posterior tooth of rostral crest to back of orbit 2,25 mm. Length of 5th pleon somite (lateral) 3,25 mm., (dorsal) 4,25 mm. Length of 6th pleon somite (dorsal) 6,5 mm. Height of sixth somite anteriorly 3,5 mm. Thickness of sixth somite 2,25 mm.

In this specimen the left leg of second pair is slightly longer than the right, extending beyond the antennal scale by the chela and four of the joints of the carpus. The right leg extends beyond the scale by about half the length of the chela; it is also a little more slender than the left leg in its terminal segments but neither is nearly so stout as in SPENCE BATE's figure. In each leg the chela is not broader, but about $1^1/_2$-times as long as the last segment of the carpus. None of the posterior legs are complete in this specimen.

Another male specimen has carapace 12 mm., rostrum 25,5 mm., posterior tooth to orbital notch 2,5 mm.: chelipeds approximately equal, in length and in stoutness, extending beyond scale by a little more than the chela.

Another male specimen, carapace 11,5 mm., carpus of fourth leg 15 mm., propodus 14,5, dactylus 1. This was the only complete leg of the last three pairs that I could find in the bottle!

In all the specimens the rostral teeth are fixed, except for the last two or three (on the carapace) which are indistinctly separated by articulation".

In the second specimen (carapace 12 mm.) the legs of the 2nd pair are described by Dr. CALMAN as equal and extending beyond the scale by a little more than the chela, just as in the ova-bearing female from Stat. 251. The slight inequality of the 2nd legs in the first specimen may therefore, no doubt, be considered as an individual variation.

DOFLEIN's description of *Plesionika spinipes* Bate var. *grandis* accords perfectly well with the specimens from Stat. 251, but measurements of the 5th and 6th abdominal somite like also of the legs, which are so characteristic of the species of Pandalidae, were not given and in the photographed figures on Plate III the legs are quite indistinct. Upon my request Professor ZIMMER of the Zoological Institute of Munich has been so kind to send me some type-specimens of this variety collected partly near Misaki, partly near Fukuura, Sagami Bay. Unfortunately in most specimens, especially those from Fukuura, the rostrum is broken off and the legs badly damaged, but in the five females from Misaki, four of which are ova-bearing, all the legs are well-preserved and their measurements are mentioned in the Table. A close examination of these specimens and of their measurements proved at once that they fully resemble those from Stat. 251, except only in one particular, namely that in the japanese specimens the dactyli of the three posterior legs are a little longer in proportion to the propodi. The difference is, however, very slight and the examination of a larger number of indian specimens of the same size as those from Misaki will probably show that such a difference does not exist. In the japanese specimens the 1st tooth of the rostrum stands just as near the orbital margin as in those from Stat. 251 and usually six teeth stand on the carapace, in N° 8 of the Table, however, five.

Table of Measurements in millimeters.

	1	2	3	4	5	6	7	8
Entire length	126	122	79	81	.	77	77	74
Length of rostrum	36	33	23,75	22	broken	22	21,7	broken
„ „ carapace	21	20,75	13,25	14,5	14	13	12,75	12
„ „ abdomen	69	68,25	42	44,5	.	42	42,55	40
Number of rostral teeth on the upper margin	45	48	45	47	.	48	47	.
Number of rostral teeth on the lower margin	22	27	27	25	.	24	26	.
Length of 5th abdominal somite	6,75	7	4,3	4,75	4,5	4	4,2	3,5
„ „ 6th „ „	10,5	10,25	7,75	8	7,5	7,5	7,3	6,7
Length of telson	15	14,5	9,5	10	9,75	9,25	9,25	9
Height of 6th somite anteriorly	6,5	6	4,5	4,6	4,4	4,25	4,2	4
Thickness of 6th somite in the middle	4,5	4	2,6	2,9	2,75	2,6	2,6	2,5
Length of carpus of 3rd leg	23	22,5	16	16	15	15	14	14
„ „ propodus „ „ „	16,5	18	13,75	13	12	12	11,5	11
„ „ dactylus „ „ „	2	2,5	2,5	2,9	2,8	2,8	2,8	2,7
„ „ carpus of 4th leg	.	23,5	16	16	15	15	14,25	14,25
„ „ propodus „ „ „	.	23,5	17	16,5	15	15	14,5	14,25
„ „ dactylus „ „ „	.	2,3	2	2,4	2,2	2,3	2,3	2,25
„ „ carpus of 5th leg	21	25	18	17,5	16,75	16,5	16	16,25
„ „ propodus „ „ „	25	29	22	20,5	18,25	19,75	19	18,25
„ „ dactylus „ „ „	2	2	1,85	2,25	2,05	1,9	2,1	2

N° 1—3 Stat. 251, N° 1 female without eggs, N° 2 ova-bearing female, N° 3 young specimen; N° 4—8 type-specimens of *Plesionika spinipes* Bate var. *grandis* Dofl. from near Misaki, Sagami Bay, Japan, depth 200—300 m., all ova-bearing, except N° 8.

General distribution: Off Cape Comorin (Alcock); North of New Guinea (Spence Bate); Sagami Bay, Japan (Doflein, Balss); Kagoshima (Balss); Kermadec Islands (Chilton).

3. *Parapandalus serratifrons* Borr. Pl. XII and XIII, Fig. 34—34*e*.

Pandalus (Parapandalus) serratifrons L. A. Borradaile, in: A. Willey's Zoological Results. Part IV. Cambridge, Sept. 1899, p. 411, Pl. XXXVII, fig. 8*a*—8*d*.
Pandalus (Parapandalus) tenuipes L. A. Borradaile, l. c. p. 412, Pl. XXXVII, fig. 9.
? *Pandalus pristis* W. de Haan, Fauna Japonica, Crustacea, 1849, p. 175.

Stat. 306. Febr. 8, 1900. 8° 27′ S., 122° 54′.5 E. Lobetobi Strait. 247 m. Bottom sandy mud. 91 specimens, viz. 35 males and 56 females, that are nearly all egg-laden.
Stat. 312. Febr. 14, 1900. 8° 19′ S., 117° 41′ E. Saleh-bay, North coast of Sumbawa. 274 m. Bottom fine, sandy mud. 126 specimens, viz. 46 males, 50 females, 22 of which are ova-bearing and 30 young specimens.

The rostrum which in the adult species is 2—$2^1/_3$-times as long as the carapace and in younger individuals even $2^1/_2$-times, is very slightly depressed as far as the tip of the antennular peduncle and from here it is moderately curved upwards, running then straight forward to the acute tip; the gastric carina begins on the middle of the carapace, it is low and rounded. In Fig. 8*a* of Borradaile's paper the rostrum runs almost horizontally forward, but Dr. Calman wrote me that in the three cotypes of the British Museum Collection the rostrum is distinctly bent upwards near the base. The upper margin is finely and evenly serrate

with 50—66 small, close-set teeth, that reach to near the tip and four, five or six of which stand on the carapace behind the orbital margin; the distance between the 1st tooth and that margin measures $^1/_7$ or $^1/_8$ the length of the carapace. The carapacial teeth (Fig. 34*a*) gradually increase a little in size, so that, like in *Parap. spinipes* (Bate), those that are placed above the eyes, are somewhat larger than the following that decrease in size; sometimes, though rarely, these larger proximal teeth are a little longer, their apices a little farther distant from one another than usually, like in Fig. 9 of the original description. The lower margin bears 32—44 teeth, that are a little smaller than those of the upper; the 1st tooth stands just beyond the tip of the antennular peduncle and the foremost one or two stand just before the anterior tooth of the upper margin. All the teeth of the rostrum are fixed, not movable as did describe them BORRADAILE, except the first one or two of the upper margin: as Dr. CALMAN mentioned, also in the cotypes of the British Museum they are fixed.

Antennal tooth well-developed, though small, hardly reaching to the cornea of the eye-peduncles when stretched forward; branchiostegal spine much smaller, directed forward and downward.

Posterior margin of 3rd abdominal tergum moderately convex. Sixth somite (Fig. 34*b*, 34*c*), measured dorsally, twice as long as fifth and twice or slightly more than twice as long as high or broad anteriorly; the 6th somite, the upper border of which is faintly grooved longitudinally, is rather strongly compressed, so that, when looked at dorsally, the thickness in the middle proves to be only about one-fifth the length. Telson as long as 6th somite, distinctly shorter than the endopodite of the caudal fan, though the longer terminal spinules reach as far backward, endopodite much shorter than exopodite; there are three pairs of small, dorso-lateral spinules, besides those at the tip.

Eyestalks of moderate size, cornea more than half the length of the ophthalmopod, ocellus distinct, circular, almost independent, only anteriorly for a short distance in contact with the cornea.

Antennular peduncle short, reaching only along about the two proximal fifths of the antennal scale, 3rd joint hardly longer than 2nd, stylocerite acute, as long as basal article; flagella subequal, nearly as long as the body, rostrum included.

Antennal peduncle reaching to the distal extremity of 1st or 2nd antennular article, flagellum twice as long as the body, rostrum included; scale as long as the carapace, nearly half as long as the rostrum, a little more than 5-times as long as wide proximally, rather narrow, distinctly tapering, the terminal spine projecting beyond the truncate tip of the lamella.

The external maxillipeds reach by the terminal joint and in the male one-fourth, in the female one-sixth the penultimate beyond the antennal scale; Dr. BORRADAILE was wrong, when describing the third maxilliped as longer by its last two joints than the scale, for in his figure 8*a* it is not the case: Dr. CALMAN, however, informed me that in the cotypes the third maxillipeds extend beyond the scale by very little more than the last segment. Penultimate joint slightly more than one and a half as long as terminal, exopodite small, reaching along the proximal third of the antepenultimate joint. The legs of the 1st pair project by the terminal joint and one-half to two-thirds the carpus beyond the antennal scale, while they surpass the external maxillipeds by the terminal joint and one-fourth or one-fifth of the carpus; the carpus

is in the adult female $2^1/_2$-times, in the male almost $2^1/_2$-times as long as the terminal joint, a microscopical dactylus seems to be present. According to the original description the peraeopods of the 1st pair should surpass the external maxillipeds by their last two joints, this is not the case and already negatived by the figure 8*a* itself.

The peraeopods of the 2nd pair are equal and reach by the chela and one-third to two-fifths of the carpus beyond the antennal scale, while the meri extend as far forward as the antennular peduncle; wrist composed of 25—30 joints, terminal joint twice as long as broad, as long as the three preceding combined. Chela nearly twice as long as the last joint of the carpus, fingers two-fifths longer than palm.

The three posterior legs, that much resemble those of *Parap. spinipes* (Bate), are very long and slightly increase in length posteriorly; the peraeopods of the 3rd pair measure in the male, long 82 mm., (N° 6 of the Table) two-thirds, in the ova-bearing female, long 87 mm., (N° 9 of the Table) three-fourths of the entire length, rostrum included, those of the 4th pair in the male three-fourths, in the ova-bearing female seven-eighths, those of the 5th pair, finally, in the male four-fifths, in the ova-bearing female ten-elevenths of that length. The legs of the 3rd pair reach, both in the male and in the female, by the dactylus, propodus and nearly the entire carpus beyond the antennal scale, those of the 4th pair by the dactylus, the propodus and in the male by three-fourths, in the female eight-ninths of the carpus, the legs of the 5th pair, finally, by the dactylus, the propodus and in the male by two-thirds, in the female four-fifths of the carpus. The carpi slightly increase in length from the 3rd to the 5th pair, the propodi, however, much more, so that those of the 5th pair are one and a half or a little more than one and a half as long as the propodi of the 3rd pair; the meri, that show nearly the same length in the three legs, are armed with slender distant spines. The dactyli are rather (Fig. 34*d*, 34*e*) short in proportion to the length of the propodi, measuring $^1/_9$ to $^1/_{12}$ of the latter; they are, however, very slender, terminate in a nearly straight terminal claw (stylopodite), at the base of which a short spine and a few setae are implanted. So e. g. are the dactyli of the 5th pair (Fig. 34*e*) of an adult, ova-bearing female 2,4 mm. long, 11- or 12-times as long as wide at base, the terminal claw (stylopodite), 0,4 mm. long, measures one-sixth the whole length of the joint, while the accessory claw measures only one-third of the terminal.

The male attains a length of 85 mm. from apex of rostrum to tip of telson, the largest ova-bearing female is 102 mm. long.

Table of Measurements in millimeters.

	1	2	3	4	5	6	7	8	9	10	11
								about			
Entire length	70	102	90	88	88	82	71	64	87	86	.
Length of rostrum	25	35,5	30,5	30	30,25	26,25	23,5	broken	27,5	30	broken
„ „ carapace	10,5	15,5	14	13,5	13,75	13	11	10	14,3	13,5	12
Number of teeth on upper margin	6 63	6 66	6 52	5 65	6 58	60	52	.	50	57	.
„ „ „ „ lower „	33	43	32	44	39	35	37	.	34	34	.
Length of 5th abdominal somite	3,6	5,25	4,5	4,5	4,5	4,6	3,7	3,25	5	4,5	4,25
„ „ 6th „ „	7,5	10,5	9,5	9,5	9,25	8,75	7,6	7,25	9,75	9	8,4
„ „ telson	broken	11	9,5	9,5	9,5	9	7,5	7	9,5	9	8,5

	1	2	3	4	5	6	7	8	9	10	11
Height of 6th somite anteriorly.	3,6	5	4,75	4,5	4,5	4	3,7	3,6	4,7	4,5	4,1
Minimum thickness of 6th somite	1,5	2,3	2	2	2	1,7	1,4	1,2	1,75	1,75	1,7
Length of carpus of 3rd leg .	15,5	.	.	19,25	20,5	16,2	16	15	19,3	21	17
„ „ propodus „ „ „ .	13,5	.	.	18	18,25	14,6	13,5	13,7	17,5	16,5	15,25
„ „ dactylus „ „ „ .	1,5	.	.	2	2	1,52	1,55	1,7	2	2	1,7
„ „ carpus of 4th leg .	16,25	23	21	22	22	16	16	15,5	22,5	.	18,75
„ „ propodus „ „ „ .	18,7	25,5	23,5	wanting	25,5	19	18,5	18,75	24	.	22
„ „ dactylus „ „ „ .	wanting	2,14	2,18	„	2,1	1,45	1,84	1,88	2,2	.	2,2
„ „ carpus of 5th leg .	„	25	21	23,25	23,5	17	17	16,5	24	23	20,5
„ „ propodus „ „ „ .	„	29	24	28	29	21,5	22,5	21,5	28	28	26,2
„ „ dactylus „ „ „ .	„	2,25	2	2,25	2,5	1,92	1,92	2,06	2,75	2,46	2,6

N° 1—5 Stat. 306, N° 1 male, N° 2—5 ova-bearing females; N° 6—11 Stat. 312, N° 6—8 males, N° 9—11 ova-bearing females, the entire length of N° 11 could not be given, the rostrum wanting entirely.

Parapandalus tenuipes Borr., which occurs in the same locality as this species, is no doubt identical. The description agrees almost literally with that of *Parap. serratifrons* and no characters are mentioned by which both forms can be distinguished. When the figure of this species (l. c. fig. 9) is compared with that of *Parap. serratifrons*, some differences are, however, recognizable, which probably have led the author to consider *Parap. tenuipes* as a distinct species, but in this case it is quite singular that they were not indicated in the description. In the figure of *Parap. tenuipes* the propodus of the 1st pair of legs is longer in proportion to the carpus than in *Parap. serratifrons*, in this species the carpus of the 3rd pair appears as long, fig. 8*a*, as the propodus, but in the figure 9 distinctly longer, in fig. 8*a* the carpus of the 4th pair appears a little shorter than the propodus, in fig. 9 a little longer than this joint and, as regards the 5th pair, the propodus appears in fig. 8*a* a little longer, but in fig. 9 a little shorter than the carpus. The rostral teeth of the upper margin appear proximally farther distant from one another in fig. 9 than in fig. 8*a*, but I have already pointed out (p. 147) that in some specimens of *Parap. serratifrons* the rostral teeth are slightly longer, their apices farther distant from one another than is usually the case. As regards the differences in length of the joints of the legs, I may remind of the fact that a similar variability in the measurements has also been observed in *Ples. martia* (A. M.-Edw.) var. *semilaevis* Bate (p. 119), but it occurs indeed also in *Parap. serratifrons*, as results from the Table of Measurements. The propodus of the 3rd pair of the ova-bearing female (N° 10), for instance, is much shorter in proportion to the carpus than in the egg-laden female (N° 4), the propodus of the 4th pair in the female (N° 11) longer in proportion to the carpus than in the female (N° 9), the dactylus of the 4th pair in the male (N° 6) shorter in proportion to the propodus than in the male (N° 7), the propodus, finally, of the 5th pair in the female (N° 11) much longer in proportion to the carpus than in the female (N° 3). Therefore both species are considered as identical.

Dr. J. J. Tesch, formerly of the Leyden Museum, has been so kind to examine for me the only still existing specimen from Japan, that was described by de Haan (Fauna Japonica, Crust., p. 175) under the name of *Pandalus pristis*, and to compare it with an adult, ova-

bearing female of *Parap. serratifrons* Borr. from Stat. 306, which I had sent to him. Having received his observations and measurements, I conclude that this specimen must be referred to *Parap. serratifrons* Borr., for it only differs by a somewhat larger size and by the carpus of the 2nd legs being of a darkbrown colour, while in *Parap. serratifrons* it is whitish. The specimen looks, as Dr. TESCH wrote me, rather poorly, is apparently badly preserved, damaged and partly putrefied. The length from the orbital margin to the tip of the telson is about 79 mm., in the largest measured specimen of *Parap. serratifrons* only 67 mm.; the other measurements are the following:

Length of carapace from orbital to posterior margin: 18 mm.
Length of rostrum as far as preserved: 27 mm.
Length of abdomen without telson: ± 45 mm.
Length of 5th abdominal somite, measured dorsally: 6 mm.
Length of 6th abdominal somite: 13 mm.
Maximum height of 6th somite: 5,75 mm.
Thickness of 6th somite in the middle: 2,75 mm.
Length of telson: 14 mm.

The endopodite reaches a little farther backward than the telson. The abdomen fully resembles that of *Parap. serratifrons*. Behind the orbital margin in DE HAAN's specimen five teeth stand on the carapace and the teeth fully resemble those of that species.

The external maxillipeds, the penultimate joint of which is one and a half as long as the terminal, reach beyond the antennal scale by the terminal joint and nearly one-sixth of the penultimate; exopodite relatively as long as in the specimen of *Parap. serratifrons*. The legs of the 2nd pair are equal, 43 mm. long; the carpus is 18,5 mm. long and 0,75 mm. thick at its distal extremity, for the female of *Parap. serratifrons* these numbers are 14 mm. and 0,58 mm., so that their proportion proves to be the same. In DE HAAN's specimen the 2nd legs, of which the carpus has a dark brown colour, reach almost as far forward as the external maxillipeds, but in his description we read "maxillae quintae, pes primus sinister et pedes secundi laminis ant. inf. multo longiores", like in *Parap. serratifrons*. Of the three posterior legs, that have no epipodites, the meri are armed with some distant spines; the three last joints (carpus, propodus and dactylus) are wanting.

The identification of DE HAAN's species with *Parap. spinipes* (Bate) [H. BALSS, Ostasiatische Decapoden, II, 1914, p. 31] proves thus to be erroneous.

Parapandalus pristis (Risso) from the Mediterranean (Plate XIII, Fig. 35, 35*a*) bears such a close resemblance to *Parap. serratifrons* (Borr.), that I did at first hesitate to regard the latter as a distinct species. I was, however, enabled to study three adult specimens, a male and two egg-laden females, taken off Barcelona, belonging to the Leyden Museum, and a young specimen from the Gulf of Naples (my private collection) and, thanks to these specimens, I finally succeeded in discovering a character by which both species may easily be distinguished, namely the entirely different shape of the dactyli of the three posterior legs. Not only, indeed, are these joints in the Mediterranean species shorter

in proportion to their propodi, but their form is quite different; the dactyli are namely of a much less slender shape, only 5- or 6-times as long as wide at base, the terminal claw (stylopodite) measures one-third the entire length of the joint and the accessory claw is nearly half as long as the terminal. The measurements in millimeters of the three Barcelona specimens and that from Naples are the following:

	1	2	3	4
Entire length	97	98	97	about 75
Length of rostrum	32,5	35	33	23 + ?
„ „ carapace	13,3	13	13,5	11
Number of teeth on upper margin.	58	61	63	
„ „ „ „ lower „	33	45	47	
Length of 5th abdominal somite.	5,2	4,7	4,75	3,5
„ „ 6th „ „	10,5	10,5	11	8,9
„ „ telson	11?	9,5	9,75	8,25
Height of 6th somite anteriorly	4,7	4,5	4,5	3,5
Minimum thickness of 6th somite	1,9	2	1,75	1,5
Length of carpus of 3rd leg	13,5	19,5	20,5	16,25
„ „ propodus „ „ „	12,5	15,2	8,3	13,5
„ „ dactylus „ „ „	1,16	wanting	0,9	1
„ „ carpus of 4th leg	.	20	19,5	
„ „ propodus „ „ „	.	20,5	20	
„ „ dactylus „ „ „	0,94	1,2	1,3	
„ „ carpus of 5th leg	14	21	23	17,5
„ „ propodus „ „ „	16,5	24,3	21	19,75
„ „ dactylus „ „ „	0,94	1,2	1,27	1

N° 1 male, N° 2 and 3 ova-bearing females of *Parapandalus pristis* (Risso) from off Barcelona. When measuring the 4th leg of the male, the carpus and propodus were broken, so that it proved impossible to measure them exactly. When comparing these measurements with those of *Parap. serratifrons*, the close resemblance will strike; of the female (N° 3) the propodus of the 3rd leg is abnormally short, while the propodus of the 5th is shorter than the carpus. N° 4 Gulf of Naples.

Pandalus escatilis Stimps. from off Madeira seems to be likewise a closely related form, but to differ from *Parap. serratifrons* Borr. by the endopodite of the external maxillipeds resembling that of *Pandalus annulicornis* Leach: in the latter species indeed the penultimate joint of the external maxillipeds is not longer, but shorter than the terminal (Vide W. T. Calman, Annals Mag. Nat. History. Ser. 7, Vol. III, 1899, Pl. II, fig. 1*d*).

General distribution: Blanche Bay, New Britain (Borradaile); D'Entrecasteaux Group, Britisch New Guinea (Borradaile).

Dorodotes Bate.

The genus *Dorodotes* Bate is still only represented by one species, a rare form observed in the Indian Archipelago and in the Bay of Bengal, where it occurs at the great depths varying between 1050 and 1530 fathoms.

1. *Dorodotes reflexus* Bate.

Dorodotes reflexus C. Spence Bate, Report Challenger Macrura, 1888, p. 678, Pl. CXVI, fig. 3.
Dorodotes reflexus A. Alcock, Descript. Catalogue Indian Deep-Sea Crustacea, Calcutta 1901, p. 109.

Stat. 221. Nov. 4. 6° 24′ S., 124° 39′ E. Banda Sea. 2798 m. Bottom solid bluish grey mud with foraminiferae, covered by a 5 cm. thick layer of brown mud, uppermost layer of foraminiferae. 1 adult specimen.

Unfortunately this specimen is much damaged, it has no abdomen and the three posterior legs are also wanting, one of these legs and parts of two other ones are lying loose in the tube. Carapace 25 mm. long from the orbital to the posterior margin, rostrum, measured in a straight line from the orbital margin to the apex, 13,4 mm. There are 7 teeth on the upper margin of the rostrum proper and 9 on the dorsal crest of the carapace, of which the first five are movable, being distinctly articulated which is not the case in the others; lower margin with 6 teeth, the 1st of which stands at the far end of basal antennular article. Antennular peduncle a little shorter than the rostrum, the difference as long as 3rd antennular article; 2nd article one and a half as long as 3rd, stylocerite acuminate, as long as basal article. Antennal scale 15 mm. long, a little more than half as long as the carapace; terminal spine of the outer margin shorter than the obtuse tip of the lamella.

The external maxillipeds reach by one fourth their terminal joint beyond the antennal scale, while the 1st pair of legs reach to the tip of the latter, being slightly shorter than the external maxillipeds.

The peraeopods of the 2nd pair extend by the chela and the four last joints of the carpus beyond the distal extremity of the antennal peduncle; the carpus is 10-articulate, the 1st and the last or 10th annulation are longer than the rest and the 1st is slightly longer than the last; the rest are a little unequal, the 7th—9th are of equal length and the shortest of all.

General distribution: Near Banda Island (Bate); Philippine Islands (Bate); Bay of Bengal (Alcock).

Heterocarpus A. M.-Edw.

The genus *Heterocarpus* A. M.-Edw., chiefly characterized by the longitudinal carinae of the carapace in addition to the multiarticulate carpus of the 2nd pair of legs which are of unequal length and size, is nowadays represented by about 20 species and 1 variety, that are distributed throughout the Atlantic and the Indopacific regions. *Heteroc. ensifer* A. M.-Edw., for which this genus was established in 1881, was captured by the expedition of the "Blake" (1877—1880) off the islands of St. Kitts, Montserrat, Barbados and Grenada, West-Indies; specimens of the same species, however, had already been taken in 1874 by the "Challenger" between the Philippine Islands and Borneo. *Heteroc. ensifer* has also been recorded from the Hawaiian Islands, New Britain and the Sagami Bay, Japan, so that its range is rather extensive. *Heteroc. carinatus* (S. I. Smith), established on a young specimen from the east coast of the United States, must no doubt be considered as identical with this species. A new variety *parvispina* was obtained by the "Siboga" in the Bali Sea, north of Sulu Island and near the

Kei-islands. Besides *Heteroc. ensifer* still three other species occur in the West-Indian seas, viz. *Heteroc. oryx* A. M.-Edw. from the Gulf of Mexico, *Heteroc. laevis* A. M.-Edw. from off Martinique and *Heteroc. Alexandri* A. M.-Edw. from Havannah: the last mentioned form has also been recorded from the Hawaiian Islands. While the western Atlantic is inhabited by four species of this genus, only one is known from the eastern, namely *Heteroc. Grimaldii* A. M.-Edw. and Bouv., which was taken by the "Talisman" near the Azores.

By far the largest number of species are, however, found in the Indopacific and of these the majority occur in the Indian Archipelago. No less than 8 species indeed, including the already mentioned variety *parvispina* of *Heteroc. ensifer* A. M.-Edw., have been obtained by the "Siboga". Of *Heteroc. Wood-masoni* Alcock, a species hitherto still only imperfectly known by two young individuals from the Andaman Sea, 27 well-preserved specimens were collected in Madura Strait, the Bali Sea, off Makassar and near the Kei-islands. *Heteroc. tricarinatus* Alcock & Anderson, first observed in the Arabian Sea and afterwards also near East London, Cape Colony, was taken south of Muna Island and at the entrance of the Gulf of Boni. The closely related *Heteroc. gibbosus* Bate, first discovered by the "Challenger" off Tablas Island, one of the Philippines, was captured in the Bali Sea, at the southern entrance of the Strait of Makassar and near the Kei-islands, where several specimens were collected: this species, however, is also fairly common in the Andaman Sea, the Bay of Bengal and the Arabian Sea, off the Travancore coast. *Heteroc. lepidus,* one of the two new species obtained by the "Siboga", occurs in the Flores Sea and near the Kei-islands. *Heteroc. laevigatus* Bate is known from East London, Cape Colony, from the Arabian Sea, from the Banda Sea, from off Banda Islands and ranges as far as the Hawaiian Islands. *Heteroc. signatus* Rathb. is still only known from the Hawaiian Islands, *Heteroc. unicarinatus* Borr. only from off Providence Island, north of Madagascar and *Heteroc. longirostris* Mac Gilchrist only from the Bay of Bengal. The 3 or 4 remaining species are those, in which two or three abdominal terga are produced posteriorly into overhanging spines. In the first place the interesting new *Heteroc. Sibogae*, of which 42 fine and well-preserved specimens were collected in various parts of the Archipelago, a form which is related to *Heteroc. ensifer* A. M.-Edw.: it occurs also in the Andaman Sea. *Heteroc. dorsalis* Bate, first discovered by the "Challenger" off Banda Islands, was taken by this expedition at no less than eleven Stations in various parts of the Archipelago, from the Bali Sea to Menado and the Kei-islands. The closely allied *Heteroc. affinis* Borr. is still only known from Saya de Malha in the Western Indian Ocean, *Heteroc. Alphonsi* Bate, finally, taken by the "Challenger" south of the Philippines and off Japan, occurs also in the Andaman Sea, the Bay of Bengal and the Arabian Sea and has even been observed off Cape Natal: it appears, however, somewhat doubtful whether this form and *Heteroc. affinis* are indeed different from *Heteroc. dorsalis* Bate.

Three species, finally, occur on the west coast of America, firstly *Heteroc. vicarius* Faxon, the representative of the indian *gibbosus* and which has been taken in the Gulf of Panama, furthermore two closely related species, *Heteroc. hostilis* Faxon and *Heteroc. affinis* Faxon, representatives of *Heteroc. dorsalis* and *Alphonsi*: of these two *Heteroc. hostilis* is also found in the Gulf of Panama, the other off Acapulco and near Las Tres Marias.

The vertical range of the species of *Heterocarpus* varies rather much, not only according to the species, but often also one and the same species has been observed at various depths. *Heteroc. Alexandri* A. M.-Edw. was obtained by the "Blake" off Martinique at 1030 fathoms like also *Heteroc. tricarinatus* Alcock & Anderson south of Muna Island: this is the greatest depth, at which a species of this genus was observed. *Heteroc. ensifer* A. M.-Edw. on the contrary occurs at less considerable depths and was taken e. g. in Pailolo Channel, Hawaiian Islands, in 31 to 290 fathoms. While some species were captured at moderate depths, like *Heteroc. ensifer*, *Wood-masoni*, *vicarius* or *signatus*, other ones occur in much deeper water, so e. g *Heteroc. Alexandri*, *hostilis*, *Grimaldii* and *longirostris*.

Key to the Indopacific species of the genus *Heterocarpus* A. M.-Edw.

a_1 Abdominal terga, though some may be bluntly carinated, never produced posteriorly into overhanging spines.

b_1 Postocular carina completely wanting. Third abdominal tergum armed with an acute spine, arising from the anterior half. . . . . *Wood-masoni* Alcock

b_2 Postocular carina present. No spine on third abdominal tergum.

c_1 Postantennal carina completely wanting.

Of the upper teeth of the rostrum four on the carapace, the 1st a little before the middle of it, the 5th just beyond the orbital margin. Dactyli of the three posterior legs long and slender . . . . . *Alexandri* A. M.-Edw.

(A. MILNE-EDWARDS, Recueil de Figures de Crustacés nouveaux ou peu connus, Avril 1883, Pl. 28.)

c_2 Postantennal carina more or less developed.

d_1 Branchiostegal spine long, reaching beyond the 2nd joint of the antennal peduncle and usually projecting beyond the orbital spine.

e_1 Postantennal carina measuring only one-fourth the length of the carapace . . . . . *unicarinatus* Borr. [1])

(L. A. BORRADAILE, Annals Mag. Nat. Hist. Ser. 8, Vol. XV, 1915, p. 208.)

e_2 Postantennal carina measuring at least two-thirds the length of the carapace.

f_1 Scaphocerite little more than half the length of the carapace.

Dactyli of the three posterior legs of a stout shape and short, those of the 3rd pair measuring about one-sixth the length of the propodi . . . . . *laevigatus* Bate

1) This species is placed here, because it is described as being related to *Heteroc. longirostris* Mac Gilchrist.

f_2 Scaphocerite longer, nearly two-thirds the length of the carapace.

g_1 Rostrum about $1^3/_4$-times the length of the carapace. Orbital spine as large and projecting just as far as the branchiostegal spine. The blunt carina of the 3rd abdominal tergum posteriorly acutely produced to a bluntish point. Dactyli of 3 posterior legs short — *longirostris* Mac Gilchrist

(A. C. MAC GILCHRIST, in: Annals Mag. Nat. Hist. Ser. 7, Vol. XV, 1905, p. 237.)

g_2 Rostrum little longer than the carapace.

Branchiostegal spine much longer and more advanced than the orbital. Abdomen as in *Heteroc. vicarius* Faxon, only the 3rd tergum being crested and that bluntly . . . . . — *signatus* Rathb. [1])

(M. J. RATHBUN, in: U. S. Fish Commission Bull. for 1903, Part III, Wash. 1906, p. 918, Pl. XXI, fig. 6.)

d_2 Branchiostegal spine short, not reaching beyond the 2nd joint of the antennal peduncle and projecting less forward than the orbital.

h_1 Dactyli of the three posterior legs long and slender, those of the 3rd pair measuring about one-third the length of the propodi.

i_1 Upper margin of the rostrum proper armed with 7 or 8 teeth . . . . . — *tricarinatus* Alcock & Anderson

i_2 Upper margin of the rostrum proper armed with 2 or 3 teeth . . . . . — *gibbosus* Bate.

h_2 Dactyli of the three posterior legs short and stout, those of the 3rd pair measuring one-sixth to one-eighth the length of the propodi.

Rostrum strongly recurved, as long as the carapace, $^{5+3}_{10}$-dentate. . . . . — *lepidus* de Man

a_2 Some of the abdominal terga are sharply carinated and some carinae of them are produced posteriorly into overhanging spines.

b_1 The 3rd and 4th abdominal carinae are produced as spines.

c_1 First and second abdominal terga not sharply carinated. First tooth of postrostral crest placed a little anterior to the middle of carapace.

d_1 Spine of 4th abdominal tergum more than half as long as that of 3rd . . . . . — *ensifer* A. M.-Edw.

1) The length of the dactyli of the three posterior legs is not mentioned in the description and cannot be ascertained from the photograph.

d_2 Spine of 4th abdominal tergum measuring but one-fourth that of 3rd. . . . . *ensifer* A. M.-Edw. var. *parvispina* de Man

c_2 First and second abdominal terga provided with a high, prominent and sharp carina. First tooth of postrostral crest placed a little behind the middle of carapace *Sibogae* de Man

b_2 The 3rd, 4th and 5th abdominal terga are produced as spines *affinis* Borr. [1])

(L. A. BORRADAILE, l. c. 1915, p. 208.)

Alphonsi Bate

(C. SPENCE BATE, Report Challenger Macrura, 1888, p. 632, Pl. CXII, fig. 1.)

dorsalis Bate

1. *Heterocarpus Wood-masoni* Alcock. Pl. XIII, Fig. 36—36*c*.

Heterocarpus Wood-masoni A. Alcock, Descript. Catal. Indian Deep-Sea Crust., Calcutta 1901, p. 108.
Illustrations of the Zoology of the Investigator, Pl. LI, fig. 2.

Stat. 5. March 10. 7° 46′ S., 114° 30′.5 E. Madura Strait. 330 m. Bottom mud. 6 females of different size, 2 of which are ova-bearing and 1 young specimen.
Stat. 12. March 14. 7° 15′ S., 115° 15′.6 E. Bali Sea. 289 m. Bottom mud and broken shells. 1 male, 2 females without eggs and 1 young specimen.
Stat. 74. June 8. 5° 3′.5 S., 119° 0′ E. Off Makassar. 450 m. Bottom Globigerina ooze (obviously a thin layer). 2 females, one of which is full-grown and laden with eggs.
Stat. 254. Dec. 10. 5° 40′ S., 132° 26′ E. Near the Kei-islands. 310 m. Bottom fine, grey mud. 1 adult, ova-bearing female.
Stat. 256. Dec. 11. 5° 26′.6 S., 132° 32′.5 E. Near the Kei-islands. 397 m. Bottom greyish green mud. 2 males and 11 ova-bearing females, all adult.

Of this remarkable *Heterocarpus*, which was founded by ALCOCK on two young individuals from the Andaman Sea, no less than 27 well-preserved specimens of different size, males, ova-bearing females and young individuals, have been collected by the "Siboga", so that I am able to publish a better and more detailed description. *Heteroc. Wood-masoni* is therefore such an interesting and remarkable species, because it differs from all the other known representatives of this genus firstly by the postocular carina wanting completely, while the two other lateral carinae of the carapace are developed throughout their whole course and furthermore by the existence of a sharp, curved spine on the anterior half of the 3rd abdominal tergum.

The largest male is 131 mm. long from tip of rostrum to end of telson, the largest ova-bearing female 149 mm. In the adult species the carapace appears much higher in proportion to its length than in young individuals, one of which was figured on Plate LI of the "Illustrations of the Zoology of the Investigator". In the youngest specimen from Stat. 5 the carapace is 8,25 mm. long and 4 mm. high in the middle, twice as long as high; in the males from Stat. 256 these numbers are respectively 27 mm. and 16 mm., in the full-grown

1) This species is described as differing from *Heteroc. Alphonsi* Bate by (1) the rostrum being much more strongly upcurved, (2) by the joints of the carpus of the 2nd legs being less in number, (3) by the walking-legs being considerably longer than the antennal scale.

ova-bearing female from Stat. 74 32,5 and 19 mm., so that the carapace appears in the adult one and two-thirds as long as high.

As results from the Table of Measurements the rostrum of full-grown specimens is usually a little longer than the carapace, more rarely both are of equal length; in younger individuals it is comparatively much longer, so that in the youngest specimens from the Stations 5 and 12 the rostrum appears twice as long as the carapace. The slender, tapering rostrum runs at first downward for about half its length, while the distal part is more or less upturned, so that the apex is sometimes situated at the same level as the postrostral crest, in other specimens far above it. The upper margin is usually armed with 10 teeth, more rarely with 9 or 11 and constantly the two first stand on the carapace behind the orbital margin; these teeth are rather small, not prominent, placed at nearly equal distances from one another and reach to near the tip. The lower margin bears usually 8 teeth, more rarely 7 or 9 and in two ova-bearing females only 6 teeth were observed; these teeth are much larger than those of the upper margin, though they gradually diminish in size. A rare exception is shown by an ova-bearing female (N° 26 of the Table): besides the two teeth on the carapace there are only 3 on the upper margin, of which the anterior stands midway between the distal extremity of the antennular peduncle and that of the antennal scale, so that more than half the length of the upper margin is smooth and unarmed. The rostrum is continued nearly to the posterior margin as a prominent, though obtuse carina: in very young specimens it is less distinctly developed on the cardiac region and the gastric portion, that carries the two first teeth, appears therefore comparatively higher than in older individuals.

As already observed, there is no trace of the postocular carina, but the postantennular and the postantennal carina run uninterruptedly from the posterior border of the carapace to the orbital and branchiostegal spines. The two carinae, though nearly parallel, are on the branchial region a little farther distant than anteriorly. The slender, acuminate, orbital spine extends, beyond the 2nd joint of the antennal peduncle, to the middle of the corneae of the eyes; the branchiostegal spine is much shorter and reaches only to the middle of the 2nd joint of the antennal peduncle. Inferior marginal carina well-developed. In full-grown specimens the cardiac region is more or less rugose between the postrostral crest and the post-antennular carina and in the adult female from Stat. 74 one observes a short elevated line just below and parallel with the post-antennular carina, somewhat farther distant from the post-antennal carina than from the other.

Abdomen nearly one-third longer than carapace and rostrum combined. The 1st and 2nd terga are not only not carinate, but appear even slightly concave dorsally, especially the second. Like in other species the 1st tergum bears four tubercles in a transverse line parallel with the posterior margin; these tubercles show each an impressed point and the two lateral are a little farther distant from one another than those of the submedian pair. The 3rd tergum is armed with an acute, compressed spine, that arises in the adult species from a little more than the anterior half of the somite, strengthened on each side at its base by a faint oblique ridge that runs from the anterior border to the upper curved margin of the spine; the two ridges are in young specimens almost invisible. In the adult species the posterior margin of

the spine makes an acute angle with the slightly compressed, straight, upper border of the tergum, the spine being directed backward and little prominent; in younger individuals, however, in which the carapace is 18 mm. long and less, the angle between the posterior margin of the spine and the upper border of the tergum is much greater, almost right, so that in these specimens the spine is more prominent, more turned upward and its upper margin does not extend to the anterior border of the somite: in such specimens the spine looks as if arising from the middle of the tergum. When the spine is worn off, like in the youngest specimen from Stat. 12 or like in an adult, ova-bearing female from Stat. 256, it has the appearance of a hump-like elevation, as described by ALCOCK. On each side of the base of the spine there is a small, transverse groove, not far from and parallel with the anterior margin of the somite. In old specimens the upper border of the tergum appears, posterior to the spine, sometimes slightly fluted. The 4^{rh} and the 5th tergum are rather compressed and in full-grown specimens appear even bluntly carinate; on the 4th tergum the upper border has a small notch or angle at the posterior third and the carina of the 5th reaches to near the posterior border of the somite. Near its posterior margin the 5th somite carries on each side of the upper border a small, longitudinally grooved tubercle. In very young specimens the 6th somite is twice or even a little more than twice as long as the 5th and as long or hardly shorter than the telson, so, for instance, in the youngest specimen from Stat. 5 the 5th somite is 2,5 mm. long, the 6th 5,75 mm. and the telson 6,5 mm.; in older specimens the 6th somite is comparatively shorter, only a little more than one and a half as long as the 5th, so, e. g., in the adult female from Stat. 74 (Fig. 36*a*) the 5th somite is 10 mm. long, the 6th 16,5 mm., the telson 23 mm., in an ova-bearing female from Stat. 256 these numbers are 8 mm., 13,5 mm. and 20,5 mm. and in the adult male from the same Station 9 mm., 15 mm. and 20 mm. The dorsal surface of the 6th somite is deeply grooved longitudinally and this groove widens slightly from before backward; on each side of the groove the 6th somite carries laterally a longitudinal ridge, that reaches to the posterior third and that is situated about twice as far from the lower than from the upper border. The telson of the adult male is one-third, that of the adult female almost one and a half as long as the 6th somite; it is distinctly grooved longitudinally and bears 4 pairs of dorso-lateral spinules, besides those at the tip. In the adult the telson reaches as far backward as the outer uropods, sometimes it is a little longer or shorter and in the full-grown female from Stat. 74 it is even a little shorter than the inner uropod.

The two pairs of antennae show nothing remarkable. The stylocerite reaches about to the middle of 2nd antennular article, which is a little shorter than the 3rd, and the antennular peduncle extends scarcely beyond the middle of the antennal scale; the antennular flagella reach by a little more than half their length beyond the rostrum. Antennal flagella slightly longer than the body.

External maxillipeds little shorter than the antennal scales, their exopodite extends almost to the far end of their antepenultimate joint.

The three posterior legs are short, like in other species of this genus, in the adult the 3rd legs extend by half their dactyli or a little more beyond the antennal scales, while the two

following gradually diminish in length. Dactyli very long and slender, a little more than one-half to two-thirds the length of the propodi.

Eggs very numerous and small, 0,6—0,65 mm. long and 0,5 mm. broad.

Table of Measurements in millimeters.

	1	2	3	4	5	6	7	8	9	10	11	12	13
Carapace . .	29	27,5	20,5	20	21	8,25	20,5	21,5	21	9	32,5	18	30
Rostrum . .	33,5	30	31	28	29	16,5	27	30	30	18,5	32,5	30	28
Formula . .	$\frac{2}{11}$ / 8	$\frac{2}{10}$ / 7	$\frac{2}{10}$ / 8	$\frac{2}{10}$ / 8	$\frac{2}{9}$ / 8	$\frac{2}{10}$ / 7	$\frac{2}{10}$ / 7	$\frac{2}{10}$ / 8	$\frac{2}{10}$ / 8	$\frac{2}{10}$ / 8	$\frac{2}{9}$ / 6	$\frac{2}{10}$ / 7	$\frac{2}{10}$ / 8

	14	15	16	17	18	19	20	21	22	23	24	25	26
Carapace . .	27,5	27	30	29	28	27,5	27,5	27	26	26	26	26	25,5
Rostrum . .	30,5	27,5	29,5	29,5	31,5	32	30	31	32,5	32,5	31	29,5	30
Formula . .	$\frac{2}{10}$ / 8	$\frac{2}{10}$ / 8	$\frac{2}{11}$ / 9	$\frac{2}{10}$ / 8	$\frac{2}{9}$ / 7	$\frac{2}{11}$ / 9	$\frac{2}{10}$ / 7	$\frac{2}{9}$ / 6	$\frac{2}{11}$ / 9	$\frac{2}{10}$ / 9	$\frac{2}{11}$ / 8	$\frac{2}{10}$ / 8	$\frac{2}{9}$ / 7

N° 1—6 Stat. 5, N° 1 and 2 females with eggs, N° 3—5 females without eggs, N° 6 young; N° 7—10 Stat. 12, N° 7 male, N° 8 and 9 females without eggs, N° 10 young; N° 11 and 12 Stat. 74, N° 11 ova-bearing female, N° 12 female without eggs; N° 13 ova-bearing female from Stat. 254; N° 14—26 Stat. 256, N° 14 and 15 adult males, N° 16—26 ova-bearing females.

General distribution: Andaman Sea (Alcock).

2. *Heterocarpus laevigatus* Bate. Pl. XIII, Fig. 37—37*b*.

Heterocarpus laevigatus C. Spence Bate, Report Challenger Macrura, 1888, p. 636, Pl. CXII, fig. 3.

Heterocarpus laevigatus A. Alcock and A. R. S. Anderson, in: Annals Mag. Nat. Hist. Ser. 7, Vol. III, April 1899, p. 285; A. Alcock, Descript. Catal. Indian Deep-Sea Crustacea, Calcutta 1901, p. 105.

Heterocarpus laevigatus Th. R. R. Stebbing, in: Annals South African Museum, Vol. XV, London 1914, p. 40.

Illustrations of the Zoology of the Investigator, Crustacea, Plate XLII, fig. 1, 1*a*.

Stat. 215a. October 29. West 1000 m. distant from North point of Kabia-island reef. Banda Sea. 500 m. Bottom stone. 1 male of medium size.

The carapace is 27 mm. long, the rostrum, measured in a straight line from the orbital margin to the apex, 34 mm., while the abdomen is 60 mm. long, entire length 121 mm.: the largest male and female of this species that are known, measured, however, respectively 181 mm. and 165 mm. (A. Alcock, l. c. 1901). The rostral carina is armed dorsally with 6 teeth, of which the 5th is placed above the orbital margin, the foremost one just in advance of the eyes; ventrally there are 10 teeth, like in the specimen from the Cape Colony, recorded by the Rev. Stebbing. Apart from the somewhat different toothing of the rostrum, our specimen resembles the figure in the "Illustrations", except that the dorsal border of the 3rd abdominal somite appears in the male from Stat. 215a more strongly curved, like in the figure of Spence Bate.

When the carapace both of *Heteroc. gibbosus* Bate and of *Heteroc. laevigatus* Bate is

looked at from above, in the former the outer margin of the branchiostegal spine runs parallel with that of its fellow, the spine being directed straight forward and distinctly shorter than the 2nd joint of the antennal peduncle; in *Heteroc. laevigatus*, on the contrary, the much larger spine projects by half its length beyond the 2nd joint of the antennal peduncle, reaching as far forward as the eyes, and its outer margin is distinctly curved inward.

As regards the abdomen, both species fully agree with one another.

The antennular peduncle reaches just beyond the middle of the antennal scale, the 2nd article is a little longer than the 3rd, and the stylocerite, the outer margin of which is concave, extends almost to the far end of the peduncle; the flagella are probably of equal length, 65 mm. long, nearly as long as carapace and rostrum combined.

Antennal scale (Fig. 37) about half as long as the rostrum, distinctly narrowing anteriorly and about $3^1/_2$-times as long as broad, presenting its greatest width at the posterior fourth; in *Heteroc. gibbosus* the antennal scale appears a little broader in proportion to its length and the outer margin appears a little more convex. Antennal flagellum 240 mm. long, twice as long as the body.

The external maxillipeds, the terminal joint of which is almost $1^1/_2$-times as long as the penultimate, project as far forward as the antennal scale; exopodite rudimentary, $1^1/_2$ mm. long.

Legs of the 1st pair a little shorter than the external maxillipeds.

The shorter stouter leg of the 2nd pair is placed on the right side; carpus 7-jointed, the 1st and the last joint of the same length and slightly shorter than the 5 other short and equal joints combined; chela little shorter, but broader than the carpus, fingers hardly shorter than the palm.

While this leg extends only by the fingers beyond the antennal peduncle, its slender fellow reaches to the tip of the antennal scale.

This species also differs from *Heteroc. gibbosus* Bate by the much shorter dactyli of the 3 posterior legs, which, as regards their other relative proportions, agree with this species. In a male of *Heteroc. gibbosus* from Stat. 256, that has about the same size as the male of *Heteroc. laevigatus*, the propodus and the dactylus of the 3rd leg are respectively 14,5 mm. and 5,2 mm. long, in the male of *Heteroc. laevigatus*, however, these numbers are 12,75 mm. and 2,4 mm., the dactyli (Fig. 37*a*) measuring in this species only about one-sixth, in *Heteroc. gibbosus* about one-third of the propodi; in *Heteroc. gibbosus* the dactylus is slender, nearly 9-times as long as wide at base, and armed along the proximal half of its lower margin with 6 spinules, that increase in length from the 1st, near the propodus, to the 6th; in *Heteroc. laevigatus* it has a stouter shape (Fig. 37*b*), being only about 5-times as long as broad at its base, and there are only 5 spinules on the lower margin, that reach to beyond the middle, besides the spinule at the base of the claw, and these spinules are comparatively also slightly larger than in *Heteroc. gibbosus*. It is remarkable, indeed, that this character, by which the two species may so easily be distinguished, has hitherto been overlooked.

Heteroc. laevis A. M.-Edw. is a different form, distinguished, besides by the characters mentioned at p. 164, by the rostrum proper being armed dorsally with 4 small teeth and by the branchiostegal spine being small and reaching less far forward than the orbital spine.

General distribution: Off Banda Island (Spence Bate); Arabian Sea, off the Travancore coast (Alcock); East London, Cape Colony (Stebbing).

3. *Heterocarpus tricarinatus* Alcock & Anderson. Pl. XIII and XIV, Fig. 38—38*d*.

Heterocarpus tricarinatus A. Alcock & A. R. S. Anderson, Journal Asiatic Soc. Bengal, Vol. LXIII, pt. 2, 1894, p. 154.
Heterocarpus tricarinatus A. Alcock, Descript. Catal. Indian Deep-Sea Crustacea, Calcutta 1901, p. 107.
Heterocarpus tricarinatus Th. R. R. Stebbing, in: Annals South African Museum, Vol. XV, London 1914, p. 39.
Illustrations of the Zoology of the Investigator, Crustacea, Plate LI, Fig. 1.

Stat. 208. Sept. 22. 5° 39′ S., 122° 12′ E. South of Muna Island. 1886 m. Bottom solid green mud. 1 adult male and 1 young female.
Stat. 211. Sept. 25. 5° 40′.7 S., 120° 45′.5 E. Entrance of the Gulf of Boni. 1158 m. Bottom coarse grey mud, superficial layer more liquid and brown. 1 young female.

The adult male from Stat. 208 measures 119 mm. from tip of rostrum to end of telson, the rostrum, 27 mm. long, is $^1/_{10}$ shorter than the carapace, which proves to be 30 mm. long, when measured from the orbital to the posterior margin; the abdomen, 62 mm. long, is but little longer than carapace and rostrum taken together. The whole body, except the thoracic legs and the pleopods, is covered with a close and fine tomentum. This specimen fully agrees with the figure in the "Illustrations", except that the upper margin of the rostral teeth makes a distinct angle with that part of the upper border which is situated between two teeth, while in the figure that angle is not indicated. The upper margin of the rostrum is armed with 14 teeth, the 6th of which stands above the orbital margin, the lower with 11. The abdominal terga, even the third, are described by Professor Alcock as quite smooth and non-carinate, I wish, however, to remark that the 3rd tergum (Fig. 38*a*) shows on each side of the middle a shallow depression, that fades away towards the anterior and the posterior margin, so that the tergum looks at first sight as if it were very bluntly ridged, nearly as in *Heteroc. gibbosus* Bate; this pseudo-ridge is, however, a little broader than in this species and less curved longitudinally; it is continued on the 4th and 5th somite, but no more visible on the 6th. Sixth somite one-fifth longer than fifth; telson twice as long as 6th somite, nearly as long as the uropods, faintly grooved longitudinally and armed with 4 pairs of dorso-lateral spinules, besides those at the tip.

The antennular peduncle reaches to the distal third of the scaphocerite, 2nd joint a little longer than 3rd; stylocerite acuminate, reaching to the far end of 2nd antennular article, with the outer margin concave and with a small blunt process at its base, like in other species; inner antennular flagellum about as long as the animal without the telson. Scaphocerite half as long as the carapace, 3-times as long as broad (Fig. 38*b*), presenting its greatest width at the proximal third and narrowing to the tip; terminal spine a little shorter than the distal tip of the lamella. Antennal flagellum one and a half as long as the entire length of the animal.

The external maxillipeds project by half their terminal joint, which is one and a half as long as the penultimate, beyond the antennal scale; exopodite well-developed, reaching nearly to the middle of the antepenultimate joint of the endopodite.

First pair of legs distinctly shorter than the external maxillipeds, though still reaching beyond the antennal scale. Of the 2nd peraeopods the shorter and stouter one is situated on the right side; the carpus is 7-jointed, the 1st or proximal joint, the longest of all, is almost half as long as the carpus, the 5 following are very short and subequal, the last half as long as the first; of the chela, which is but little shorter than the carpus, the palm appears distinctly broader than the distal joint of the latter and hardly longer than the fingers. The fingers of the other slender leg are as long as the palm. The legs of the 3rd pair (Fig. 38*c*, 38*d*) project by their dactylus and propodus beyond the antennal scale, those of the 4th by their dactylus and three-fourths of the propodus, the much shorter legs of the 5th pair, finally, by little more than the dactylus; the dactyli measure one-third of the propodi and the spines with which these legs are armed on the lower border, are arranged in the 3rd and 4th pair in two rows, in the 5th pair only in one.

The young specimen is about 58 mm. long, the rostrum is as long as the carapace, not shorter, both together a little shorter than the abdomen, which is 30 mm. long; the upper margin of the rostrum is armed with 15 teeth, 6 of which are on the carapace, the lower with 10. The depressions on each side of the middle of the 3rd tergum are already distinct, like on the 4th and 5th. The stylocerite reaches a little beyond the middle of 2nd antennular article, scaphocerite half as long as carapace. The external maxillipeds extend, like in the adult, about by half their terminal joint beyond the antennal scale, but the legs of the 1st pair reach also by half their terminal joint beyond this appendage, being hardly shorter than the outer foot-jaws. Peraeopods of the 2nd pair as in the adult. The three following legs also like in the adult male, but the dactyli are a little longer than one-third of the propodi and the legs of the 5th pair project by their dactyli and three-fifths of their propodi beyond the antennal scale.

The specimen from Stat. 211 is but little larger than the preceding, the carapace being 17 mm. long from the orbital to the posterior margin; the rostrum is broken off a little beyond the antennal scale, 5 teeth stand on the carapace, the 6th just before the orbital margin. Abdomen and legs like in the young female from Stat. 208. Stylocerite not yet reaching the far end of 2nd antennular article.

The nearest allied species is probably *Heteroc. Alexandri* A. M.-Edw. from Havannah, which according to Miss Rathbun occurs also off the Hawaiian Islands (M. J. Rathbun, in: U. S. Fish Commission Bull. for 1903, Part III, Wash. 1906, p. 918). This rare *Heterocarpus* is only known by the figure in the "Recueil de Figures de Crustacés nouveaux ou peu connus", published by A. Milne-Edwards in 1883, so that it is much to be regretted that no description at all was given by Miss Rathbun of the specimen, that she had the occasion to study. In this species, however, only four teeth of the rostral carina are placed on the carapace and the posterior tooth stands a little before the middle, in *Heteroc. tricarinatus*, however, constantly behind the middle. The postantennal carina has completely disappeared. The 6th abdominal somite is more than twice as long as the 5th and but little shorter than the telson, the scaphocerite, finally, has a different shape, appearing distally just as broad as at base.

A closely allied form is no doubt also *Heteroc. vicarius* Faxon from the Gulf of Panama. In this species, however, the inferior lateral carina of the carapace reaches almost to the posterior

margin, the scaphocerite has a different form and the third maxilliped is not furnished with an exopodite, but merely with a small papilla on the outer side of the basipodite.

General distribution: Arabian Sea (Alcock); East London, Cape Colony (Stebbing).

4. *Heterocarpus gibbosus* Bate. Pl. XIV, Fig. 39—39*g*.

Heterocarpus gibbosus C. Spence Bate, Report Challenger Macrura, 1888, p. 634, Pl. CXII, fig. 2.
Heterocarpus gibbosus J. Wood-Mason, in: Ann. Mag. Nat. Hist. 6. Ser., Vol. 9, May 1892, p. 368, 369, fig. 6.
Heterocarpus gibbosus A. Alcock, Descript. Catal. Indian Deep-Sea Crustacea, Calcutta 1901, p. 103.

Stat. 12. March 14. 7° 15′ S., 115° 15′.6 E. Bali Sea. 289 m. Bottom mud and broken shells. 1 male and 4 females, one of which bears ova, while another lodges an Epicarid.
Stat. 38. April 1. 7° 35′.4 S., 117° 28′.6 E. Bali Sea. 521 m. Bottom coral. 5 males, most of which are young and 4 females, one of which is provided with eggs; this egg-bearing female and still a younger one are attacked by an Epicarid.
Stat. 74. June 8. 5° 3′.5 S., 119° 0′ E. Southern entrance of the Strait of Makassar. 450 m. Bottom Globigerina ooze (obviously a thin layer). 3 full-grown males.
Stat. 256. Dec. 11. 5° 26′.6 S., 132° 32′.5 E. Near the Kei-islands. 397 m. Bottom greyish green mud. 10 males and 11 females, nearly all adult, while 2 females are ova-bearing.
Stat. 262. Dec. 18. 5° 53′.8 S., 132° 48′.8 E. Off the Kei-islands. 560 m. Bottom solid bluish grey mud, upper layer more liquid and brown mud. 2 young specimens.

The numerous specimens fully agree with the quoted descriptions and figures, but it must be observed that the dactyli of the three posterior legs, described by Col. Alcock as "very short", are indeed rather long (J. Wood-Mason, l. c. Fig. 6), measuring one-third of the propodi (Fig. 39*f*, 39*g*). Form, length and direction of the rostrum vary rather much, like also the number of teeth with which the margins are armed (confer the figures). The carapacial carina, of which the height also varies considerably, is usually armed with 6 teeth, of which the 6th stands before the orbital margin, like in Wood-Mason's figure, rarely with 7 or 5; in case of 7 teeth, five or six, rarely four, stand on the carapace behind the posterior margin, in case of 5 teeth, four. The upper margin of the rostrum proper bears usually 2 or 3 teeth, rarely 1 or 4, and these teeth are much smaller than those of the carapacial carina. The lower margin has usually 12—14 teeth, rarely 11 or 15, in only one adult specimen 10 teeth were observed, in another 9, in a third 8 and in an adult male from Stat. 74 the lower margin bears but 6 teeth; the ventral teeth gradually decrease in size anteriorly and the 2 or 3 foremost ones are rudimentary. The rostrum is more or less strongly upcurved, so that the apex is sometimes, especially in younger individuals, situated above the level of the teeth of the carapace, sometimes just as high, or below it. The outer aspect of the specimens appears therefore sometimes so different, that one is inclined to consider them as different species.

In an adult male from Stat. 74, of which the carapace measures 33 mm. from the orbital to the posterior margin and the rostrum 21,5 mm., the fifth abdominal somite, measured dorsally, proves to be 9 mm. long, the sixth 12 mm., the telson 21 mm., the terminal spines excluded, and the telson is still 1 mm. shorter than the uropods of the caudal fan; in the largest ova-bearing female from Stat. 256 carapace and rostrum are respectively 35 and 25 mm. long, the

fifth somite of the abdomen 9 mm., the sixth 12 mm., the telson 20 mm. and the latter appears as long as the outer uropod and 0,5 mm. shorter than the inner. Telson armed with 4 pairs of dorso-lateral spinules, besides those at the tip.

In the adult animal the antennal flagellum is $2^1/_4$-times as long as the body, the former measuring 300 mm., the latter 135 mm., both in a male and in an ova-bearing female, but in a female, long 125 mm., the flagellum measured 325 mm., 2,6-times as long as the body, and in a male, long 106 mm., it was 3-times as long, viz. 310 mm.

One of the two young individuals from Stat. 262 is 73 mm. long and the youngest of all that were collected, the carapace is 15,5 mm., the rostrum 21,5 mm., the abdomen 36 mm. long, the latter thus as long as carapace and rostrum combined. The rostrum (Fig. 39*d*) is strongly curved upward, reaching far above the teeth of the carapace, slender and tapering to the acuminate tip; the carapacial carina is armed with 6 teeth, of which the 4th is the largest, while the 5th and the 6th are placed before the orbital margin; the rostrum proper carries moreover 2 smaller teeth on its proximal half, one opposite the 3rd antennular article, the other opposite the apex of the antennal scale. The 5th abdominal somite is 3,75 mm. long, the 6th 5,25 mm., the telson 9,75 mm. The external maxillipeds reach in this young specimen beyond the antennal scale by one-third of their terminal joint and their exopodite is still very small, rudimentary. The 1st pair of legs, though shorter than the external maxillipeds, still just reach beyond the antennal scale, the carpus of the 3rd pair projects as far forward as the external maxillipeds, the carpus of the 4th pair as far as the antennal scale, while the carpus of the 5th pair reaches to the distal third of the latter.

As was already remarked by Spence Bate, *Heteroc. laevis* A. M.-Edw. from Martinique seems to be the nearest related form. In this species, however, the 1st carapacial tooth stands a little before the middle of the carapace and the 3 or 4 posterior teeth are placed close together, there is, finally, no trace visible of the two long lateral carinae, characteristic of *Heteroc. gibbosus* Bate.

General distribution: Off Tablas Island (Bate); Andaman Sea, Bay of Bengal, Arabian Sea, off the Travancore coast (Alcock).

5. *Heterocarpus lepidus* de Man. Pl. XIV, Fig. 40—40*c*.

Heterocarpus lepidus J. G. de Man, in: Zoologische Mededeelingen, uitgegeven vanwege 's Rijks Museum van Natuurlijke Historie te Leiden. Deel III, Afl. 4, December 1917, p. 282.

Stat. 215a. Oct. 29. West 1000 m. distant from north point of Kabia-island reef. Banda Sea. 500 m. Bottom stone. 1 female without eggs.
Stat. 262. Dec. 18. 5° 53'.8 S., 132° 48'.8 E. Kei-islands. 560 m. Bottom solid bluish grey mud, upper layer more liquid and brown mud. 1 male.

A new species pertaining to that Section of the genus, in which none of the abdominal terga are produced posteriorly into spines and in which the dactyli of the three posterior legs are very short.

The two specimens of this species, which in its outer appearance closely resembles *Heteroc. tricarinatus* Alcock & Anderson, are nearly of the same size: the carapace of the

female, measured from the orbital to the posterior margin, proves to be 31,5 mm. long, the rostrum, measured in a straight line from the orbital margin to the apex, 32 mm., the abdomen 73,5 mm., entire length 137 mm.; in the male the carapace is also 31,5 mm. long, the abdomen 74 mm., but the rostrum is broken off just before the antennular peduncle. The carapace appears in a lateral view 22,5 mm. high, being nearly one and a half as long as high. The rostrum of the female, just as long as the carapace, is strongly recurved and continued as a high compressed carina on the gastric region, gradually fading away near the posterior margin. The gastric carina is armed with 5 equidistant teeth, of which the 1st, the smallest of all, stands a little behind the middle of the carapace and the 5th above the orbital margin; the rostrum proper bears 3 teeth, the 1st above the eyes as far from the 5th gastric tooth as this tooth from the 4th, the 2nd opposite the far end of 2nd antennular article, as far from the 1st as the 1st from the tooth above the orbital margin, the 3rd a little beyond the middle, twice as far from the 2nd as the 2nd from the 1st; the 3rd and the 4th tooth of the gastric carina are the largest, the following gradually diminish in size. Ventrally the rostrum is armed with 10 rather small teeth, of which the 1st is placed between the 1st and the 2nd of the upper margin, just beyond the eyes; these teeth also gradually become smaller and the 6 anterior stand before the 3rd tooth of the upper margin. In the male the 5th tooth of the gastric carina stands just behind the orbital margin, the 1st tooth of the rostrum proper is placed above the eye, the 2nd above the far end of 1st antennular article, the 3rd, close to which the rostrum is broken, one and a half as far from the 2nd as the 2nd from the 1st.

As regards the carination of the carapace and the form and size of the two spines on the anterior margin, *Heteroc. lepidus* does not differ from *Heteroc. tricarinatus*. The superior or postocular carina begins just behind the insertion of the eyestalk, one millimeter distant from the orbital margin, runs at first backward and a little downward, but curves just in front of the middle obliquely upward and fades away near the posterior margin of the carapace; the orbital spine is small, not yet reaching as far forward as the basal process of the stylocerite, nor reaching to the posterior margin of the cornea of the eyestalk and is continued into a mere buttress instead of a well-developed carina. The branchiostegal spine has the same size as the preceding, but reaches not so far forward, namely only to the middle of the 2nd joint of the antennal peduncle; the inferior or postantennal carina is well-developed, but, like in *Heteroc. tricarinatus*, fades away on the anterior part of the branchial region. This description is taken from the female, in the male the postantennal carina is a little less prominent.

The abdomen also fully resembles that of *Heteroc. tricarinatus* Alcock & Anderson. Like in this species, in *Heteroc. gibbosus* Bate and in *Heteroc. laevigatus* Bate, the 3rd abdominal tergum appears "bluntly carinated", owing to a depression on each side of the middle, that fades away near the anterior and the posterior margin of the somite; this "blunt carina" appears indeed somewhat convex both transversely and longitudinally and is as broad as in *Heteroc. tricarinatus*, somewhat broader than in the two other species, the width in the middle being about one-fourth of the length. Sixth somite in the male $1^1/_2$-times, in the female a little more than $1^1/_2$-times as long as the fifth. Telson in the male slightly shorter, in the female a little longer than the 5th and the 6th somite taken together; in the male it is as long as the uropods,

in the female a little shorter, slightly grooved longitudinally and there are 4 pairs of dorso-lateral spinules besides those at the tip.

The two pairs of antennae also apparently agree with those of *Heteroc. tricarinatus*. In the female the stylocerite reaches just beyond the distal extremity of 2nd antennular article, in the male it is a little shorter than this article. Scaphocerite (Fig. 40*a*) in the female 15,6 mm. long, 5 mm. broad, in the male these numbers are 16,5 mm. and 5,6 mm., the scaphocerite being half as long as the carapace and 3-times as long as wide; it has the same form as in *Heteroc. tricarinatus*, but the outer margin is more regularly curved, while in *tricarinatus* it is anteriorly slightly concave.

The external maxillipeds, that bear a well-developed exopodite, extend in the female by two-thirds, in the male only by one-third of their terminal joint beyond the tip of the scaphocerite.

The thoracic legs also resemble those of *Heteroc. tricarinatus*, as regards their relative proportions, except the dactyli, which in *Heteroc. lepidus*, like in *Heteroc. laevigatus*, are considerably shorter and show a different form. The propodus and dactylus of 3rd legs (Fig. 40*b*, 40*c*) are respectively 20 mm. and 2,5 mm. long in the female from Stat. 215a, 16 mm. and 2,5 mm. in the male from Stat. 262, the dactylus measuring in the male one-sixth, in the female one-eighth of the propodus; in the adult male of *Heteroc. tricarinatus* from Stat. 208, however, the propodus of 3rd leg is 15 mm. long, the dactylus 5 mm., the latter one-third of the propodus. The dactylus (Plate XIII, Fig. 38*d*) of *Heteroc. tricarinatus* shows the same slender form as in *Heteroc. gibbosus* Bate, while its form in this new species is the same as in *Heteroc. laevigatus* Bate, namely short and stout.

In the female the peraeopods of the 3rd pair project by the dactylus, the propodus and three-fifths of the carpus beyond the antennal scale, in the male by the dactylus, the propodus and one-fifth of the carpus; those of the 4th pair in the female by the dactylus, propodus and one-fourth of the carpus, in the male these legs are partly broken; those of the 5th pair, finally, in the female by the dactylus and two-thirds of the propodus, in the male by the dactylus and half the propodus.

Three other species, all from the Atlantic, are also more or less related to *Heteroc. lepidus*. Both in *Heteroc. laevis* A. M.-Edw. from Martinique and in *Heteroc. Alexandri* A. M.-Edw. from Havannah the 1st tooth of the gastric carina stands anterior to the middle of the carapace, nearer to the orbital than to the posterior margin; in *Heteroc. laevis* the lateral carinae of the carapace are apparently wanting and the carpi of the three posterior legs are of a less slender shape, in *Heteroc. Alexandri* the postantennal carina seems to be wanting at all, the 6th somite of the abdomen is more than twice as long as the 5th, the scaphocerite does not narrow anteriorly, the dactyli, finally, of the three posterior legs are slender and elongate, all according to the figures of these species in the "Recueil de Figures de Crustacés nouveaux ou peu connus", published by A. Milne-Edwards in 1883.

Heteroc. Grimaldii A. M.-Edw. and Bouv. from the Azores differs by the postantennal carina reaching almost to the posterior margin of the carapace and by the dorsal carina of the 3rd abdominal tergum terminating posteriorly into "une pointe saillante" (Bull. Soc. Zool. de France, T. XXV, 1900, p. 58).

6. *Heterocarpus ensifer* A. M.-Edw. var. *parvispina* de Man. Pl. XIV, Fig. 41—41*b*.

Heterocarpus ensifer A. M.-Edw. var. *parvispina* J. G. de Man, in: Zoolog. Mededeelingen, uitgegeven vanwege 's Rijks Museum van Natuurlijke Historie te Leiden. Deel III, Afl. 4, December 1917, p. 282.

For the typical species confer:

Heterocarpus ensifer A. Milne-Edwards, in: Annal. Scienc. Nat. (6) XI, 1881, Art. N° 4, p. 8 and Recueil de Figures de Crustacés nouveaux ou peu connus, Avril 1883, Pl. 32.
Heterocarpus ensifer C. Spence Bate, Report Challenger Macrura, 1888, p. 638, Pl. CXII, fig. 4.
Heterocarpus ensifer W. Faxon, in: Bull. Mus. Comp. Zoology, Cambridge 1896, p. 161.
Heterocarpus ensifer L. A. Borradaile, in: A. Willey's Zoological Results. Part IV, Cambridge 1899, p. 413.
Heterocarpus ensifer M. J. Rathbun, in: U. S. Fish Commission Bulletin for 1903, Part III, Wash. 1906, p. 917, Pl. XXI, fig. 7.
Heterocarpus ensifer H. Balss, Ostasiatische Decapoden II, München 1914, p. 37.
Pandalus carinatus S. I. Smith, Bull. Mus. Comp. Zoology, Vol. X, N° 1, Cambridge, 1882, p. 63, Pl. X, figs. 2—2*f*, Pl. XI, figs. 1—3.

Stat. 38. April 1. 7° 35'.4 S., 117° 28'.6 E. Bali Sea. 521 m. Bottom coral. 1 young specimen.
Stat. 105. July 4. 6° 8' N., 121° 19' E. North of Sulu-island. 275 m. Coralbottom. 2 young specimens.
Stat. 254. Dec. 10. 5° 40' S., 132° 26' E. Off the Kei-islands. 310 m. Bottom fine grey mud. 2 adult males.

Heterocarpus ensifer A. M.-Edw., the first described species of this genus, differs from *Heteroc. Sibogae* de Man, with which it has hitherto been confounded, by the following. The carapace appears a little less high with regard to its length than in *Heteroc. Sibogae*: the carapace of the larger male from Stat. 254 is 24 mm. long and 17 mm. high, in a specimen of *Heteroc. Sibogae* from Stat. 74, however, these numbers are 26 mm. and 20,5 mm. The first tooth of the postrostral crest is constantly placed a little anterior to the middle of the carapace, in *Heteroc. Sibogae*, however, always distinctly behind the middle. Posterior to the first tooth the crest runs straight backward, but appears more or less distinctly angular in *Heteroc. Sibogae*. The 1st and the 2nd abdominal terga are not carinate, while in *Heteroc. Sibogae* both terga are provided with a high, prominent and sharp carina. In full-grown specimens, however, like in the two males from Stat. 254, the 1st tergum does not appear regularly rounded, when looked at from behind, but slightly angular, the angle, however, is rounded and smooth. On the 2nd tergum this angle is hardly visible, so that this tergum appears almost regularly rounded.

Figures of *Heteroc. ensifer* A. M.-Edw. have been published by A. Milne-Edwards, Spence Bate and Miss Rathbun (locis citatis), but in all these figures the spine, into which the carina of the 4th tergum is produced, appears but little shorter than the spine of the 3rd. In the five specimens, however, that were collected by the "Siboga", the spine of the 4th tergum is considerably smaller than that of the 3rd, its length being only one-fourth the length of the latter, when measured from the posterior margin of the somites: it is only on account of this difference that these specimens are regarded as a distinct variety. Spence Bate (l. c. p. 639) remarks about the two males, trawled by the "Challenger" between the Philippine Islands and Borneo, that the spine of the fourth tergum, "is not quite so large as that on the

preceding somite", which words no doubt imply that the difference of length was not great in his specimens and in the beautiful photograph of a specimen from the Hawaiian Islands (RATHBUN, l. c.) the spine of the 4th tergum appears more than half as long as that of the 3rd. The species, observed and photographed by the renowned american carcinologist, belongs, however, certainly to the typical *ensifer*, because Miss RATHBUN had the opportunity of comparing her Hawaiian specimens with a fair-sized individual from the Caribbean Sea.

For the rest our specimens apparently fully agree with the typical species. The larger male from the Kei-islands measures 98 mm. from tip of rostrum to end of telson and has the size indicated by MILNE-EDWARDS: unfortunately Miss RATHBUN did not mention the size of the specimens that she had observed and the numbers, mentioned by SPENCE BATE, are again a mistake (entire length 64 mm. (2,5 inch), length of carapace 21 mm., of rostrum 23 mm., of pleon 43!). In the specimen from Stat. 38, the carapace of which is 16 mm. long, the rostrum is broken off near the tip of the antennal scales, but in the other specimens the postrostral crest and the rostrum are armed dorsally with 16 or 17 teeth, five of which stand on the carapace, while the lower margin has 9 teeth; in form and size these teeth resemble those of *Heteroc. Sibogae*. In the larger male from the Kei-islands the rostrum is slightly shorter than the carapace, in the other just as long and in the two young specimens from Stat. 105 the carapace is distinctly shorter than the rostrum; in the two adult males the apex is not or scarcely situated above the level of the postrostral crest, but in the two young specimens from Sulu Island rather much.

Excepting the differences described above, the abdomen agrees for the rest with that of *Heteroc. Sibogae*: like in this species there are on the 1st tergum on each side two small tubercles situated above one another and the telson is armed likewise with 4 pairs of dorso-lateral spinules besides those at the tip; the relationship between these two species is also proved by the fact that of these 4 pairs of spinules the 2nd and 3rd pair are in both farther distant from one another than the 1st from the 2nd or the 3rd from the 4th.

As regards the two pairs of antennae and the legs, both species seem to agree with one another, but the dactyli of the three posterior legs are a little shorter in proportion to the propodi, measuring in the adult male not yet one-third of the penultimate joints. So are in the larger male from Stat. 254 the propodi of the 3rd pair 9,2 mm. long, the dactyli 2,6 mm., in the younger male, like in the young specimens from Stat. 105, they measure just one-third of the propodi; in Miss RATHBUN's photograph of a specimen from Hawaii (l. c.) the dactyli appear also distinctly shorter than one-third of the propodi. In the adult *Heteroc. Sibogae*, however, the dactyli are constantly longer than one-third of these joints and in younger individuals measure even slightly more than two-fifths of the propodi.

Table of Measurements in millimeters:

	1	2	3	4
Carapace . .	13,5	13	24	22,5
Rostrum . .	17,5	17	22,5	22,5
Formula . .	$\frac{5}{17}$	$\frac{5}{16}$	$\frac{5}{16}$	$\frac{5}{17}$
	9	9	9	9

N° 1 and 2 Stat. 105; N° 3 and 4 Stat. 254.

General distribution: The typical *Heteroc. ensifer* A. M.-Edw. was discovered off the island of Barbados, West-Indies, was taken by the "Blake" off the islands of St. Kitts, Montserrat and Grenada and, according to S. I. Smith, occurs also off the coast of Carolina; it is furthermore known from the Hawaiian Islands, where this species is one of the most abundant of deep-water shrimps (Rathbun), from New Britain (Borradaile), from between the Philippine Islands and Borneo (Spence Bate) and from Sagami Bay, Japan (Balss). — The variety *parvispina* is still only known from the Indian Archipelago.

7. *Heterocarpus Sibogae* de Man. Pl. XIV, Fig. 42—42*i*.

Heterocarpus sibogae J. G. de Man, in: Zoologische Mededeelingen, uitgegeven vanwege 's Rijks Museum van Natuurlijke Historie te Leiden, Dl. III, Afl. 4, 1917, p. 283.
Heterocarpus ensifer A. Alcock, Descript. Catal. Indian Deep-Sea Crustacea, Calcutta, 1901, p. 107.

Stat. 12. March 14. 7° 15′ S., 115° 15′.6 E. Bali Sea. 289 m. Bottom mud and broken shells. 10 adult specimens, viz. 4 males and 6 females, 5 of which are ova-bearing.
Stat. 38. April 1. 7° 35′.4 S., 117° 28′.6 E. Bali Sea. 521 m. Bottom coral. 9 young specimens.
Stat. 74. June 8. 5° 3′.5 S., 119° 0′ E. Southern entrance of Strait of Makassar. 450 m. Bottom Globigerina ooze. 6 specimens, viz. 1 adult male, 1 ova-bearing female and 4 young individuals.
Stat. 139. Aug. 4. 0° 11′ S., 127° 25′ E. North of Batjan. 397 m. Bottom mud, stones and coral. 3 adult males and 2 ova-bearing females.
Stat. 212. Sept. 26. 5° 54′.5 S., 120° 19′.2 E. West of Saleyer. 462 m. 2 adult females, one of which with eggs.
Stat. 256. Dec. 11. 5° 26′.6 S., 132° 32′.5 E. Kei-islands. 397 m. Bottom greyish green mud. 8 adult specimens, viz. 3 males and 5 females, 3 of which are egg-bearing.
Stat. 262. Dec. 18. 5° 53′.8 S., 132° 48′.8 E. Kei-islands. 560 m. Bottom solid bluish grey mud, upper layer more liquid and brown mud. 2 adult ova-bearing females.
Stat. 316. Febr. 19, 1900. 7° 19′.4 S., 116° 49′.5 E. Bali Sea. 538 m. 1 ova-bearing female.

This interesting new *Heterocarpus*, of which no less than 42 specimens were collected, both adult and young, much resembles *Heteroc. ensifer* A. M.-Edw. (A. Milne-Edwards, Recueil de Figures de Crustacés nouveaux ou peu connus, 1883, Pl. 32 and M. J. Rathbun, in: U. S. Fish Commission Bull. for 1903, Part III, Wash. 1906, p. 917, Pl. XXI, fig. 7), as regards the shape of the carapace and its carination, but is easily distinguished by the sharp carinae of the 1st and 2nd abdominal terga.

Heterocarpus Sibogae attains the length of 140 mm., both male and female, while the carapace and rostrum combined are but little shorter than the abdomen. In the adult species the rostrum, measured in a straight line from the orbital margin to the apex, appears as a rule one-fifth to almost one-third shorter than the carapace between the orbital and the posterior margin, rarely of equal length, though never longer than the carapace (Table of Measurements); in the adult female from Stat. 316 which is already provided with eggs, though not yet full-grown, as it is only 110 mm. long, the rostrum is 2,5 mm. longer than the carapace and in still younger specimens, as in those from the Stations 38 and 74, the rostrum is distinctly, to about one-third, longer than it. The postrostral crest, which commences near the posterior margin of the carapace, is more or less curved, while the upper margin of the rostrum proper runs first

downward and then more or less upward, so that the apex is sometimes placed at a higher level than the postrostral crest, sometimes at the same, sometimes, however, at a lower level. Posterior to the 1st tooth the postrostral crest is not regularly curved, but appears more or less distinctly angular and the angle is usually situated twice as far from the 1st tooth as from the proximal extremity of the crest. Postrostral crest and rostrum armed dorsally with 15—19 teeth, usually 16, rarely 12, 14 or 20, ventrally with 10—12 teeth, rarely 6—9 or 14. First tooth constantly a little posterior to the middle, at about two-fifths the length of the carapace from the posterior margin; this tooth is very small, the following become gradually larger to the 5th or the 6th, which is the largest, and then again gradually diminish in size, so that the 2 or 3 foremost teeth (also on the lower margin) are rudimentary, almost invisible. Five teeth stand usually on the carapace, the 6th above the orbital margin, rarely four or six are placed on it.

The rostrum of the full-grown ova-bearing female from Stat. 139 (N° 25 of the Table) shows an abnormal shape and is probably regenerated; 6 teeth stand on the carapace, the 7th just before the orbital margin. The rostrum, little more than half as long as the carapace, reaches hardly to the end of the antennal scales and projects horizontally forward, the tip hardly upturned. The foremost tooth of the upper margin stands just in the middle of it, while the teeth of the lower are crowded on its distal half, except the first (Fig. 42*c*).

For the rest as regards form and carination of the carapace, this species does not seem to differ from *Heteroc. ensifer* A. M.-Edw.

The 1st abdominal tergum (Fig. 42*a*) bears a rather high, prominent and very sharp carina that ends posteriorly abruptly, while the anterior margin is sloping and oblique; on each side of this carina are two small rounded tubercles, of which the superior is situated a little nearer to the carina than to the inferior, and a little below the latter there is a curved ridge, the lower boundary of the tergum. Second abdominal tergum likewise provided with a high, prominent and sharp carina; the straight upper edge of this carina makes usually a right angle with the anterior, but an acute angle with the posterior margin of the crest, so that the posterior extremity of the latter appears more or less dentiform; this is sometimes also the case with the anterior, though the extremities are never sharp. Third and fourth terga also sharply carinate and produced posteriorly into a sharp spine; the two spines are of equal length and large, the spine of the 3rd tergum reaching to the middle of the 4th, that of the 4th to the posterior margin of the 5th; the carina both of the 3rd and of the 4th tergum are slightly curved, that of the 4th commencing a little behind the anterior margin. The 5th and the 6th somite like also the telson closely resemble those of *Heteroc. ensifer* A. M.-Edw.; the 5th and the 6th somite are rounded dorsally, the 6th one and a half as long as the 5th or a little less and both somites combined are as long as the telson, which is faintly grooved longitudinally, armed with 4 pairs of dorso-lateral spinules besides those at the tip, and nearly as long as the uropods.

As regards the two pairs of antennae this species resembles *Heteroc. ensifer* A. M.-Edw. and this is also the case with the thoracic legs, except that the dactyli of the three posterior legs are somewhat longer in proportion to the propodi.

The external maxillipeds that bear a well-developed exopodite, extend to the distal third or fourth of the antennal scale and the legs of the 1st pair are but little shorter. Shorter leg of the 2nd pair either on the right or on the left side. The peraeopods of the 3rd pair (Fig. 42*d*, 42*f* and 42*h*) are nearly as long as the antennal scales, while the following become gradually a little shorter. The dactyli of the 3rd pair measure in adult specimens (Fig. 42*e*, 42*g*), both male and female, a little more than one-third of the propodi, in young individuals (Fig. 42*i*) of which the carapace is 23 mm. long, even slightly more than two-fifths; they are almost 6-times as long as broad at base and armed along the proximal half of their posterior margin with 4 or 5 rather stout spinules that slightly increase in length from the 1st or proximal to the last. So e.g. in an adult male from Stat. 12 the propodus of the 3rd legs is 10,5 mm. long, the dactylus 3,8 mm. long and 0,68 mm. broad at base, in an adult ova-bearing female from the same Station these numbers are, in the same succession, 10,8 mm., 4,1 mm. and 0,7 mm., in a young individual, finally, from Stat. 74, of which the carapace is 23 mm. long, 7,7 mm., 3,3 mm. and 0,48 mm.

The female from Stat. 316 proves that this species is already provided with eggs, when it still only measures 110 mm.

Table of Measurements in millimeters.

	1	2	3	4	5	6	7	8	9	10	11	12	13
Carapace . .	32,5	32	29	31,5	31	30,5	27	26	19	18,5	18	18	18
Rostrum . .	25	24,5	22,5	24	25	26	26	25,5	24	23,5	24	22,5	22,5
Formula . .	$\frac{5}{15}{}^{7}$	$\frac{6}{15}{}^{9}$	$\frac{5}{16}{}^{9}$	$\frac{5}{15}{}^{7}$	$\frac{4}{16}{}^{11}$	$\frac{5}{18}{}^{9}$	$\frac{5}{16}{}^{10}$	$\frac{5}{16}{}^{10}$	$\frac{5}{17}{}^{12}$	$\frac{5}{15}{}^{11}$	$\frac{5}{19}{}^{11}$	$\frac{5}{19}{}^{11}$	$\frac{5}{18}{}^{12}$

	14	15	16	17	18	19	20	21	22	23	24	25	26
Carapace . .	16,5	16	16	33	32,5	26	24	23,5	19,5	31,5	30	35	27
Rostrum . .	22,5	23	21	27	27	29	25,5	28,5	27	22,5	22	21	26
Formula . .	$\frac{5}{19}{}^{11}$	$\frac{5}{18}{}^{11}$	$\frac{5}{18}{}^{12}$	$\frac{5}{17}{}^{11}$	$\frac{5}{14}{}^{10}$	$\frac{5}{16}{}^{10}$	$\frac{5}{17}{}^{11}$	$\frac{5}{18}{}^{12}$	$\frac{5}{16}{}^{12}$	$\frac{5}{14}{}^{6}$	$\frac{4}{12}{}^{7}$	$\frac{6}{9}{}^{10}$	$\frac{5}{18}{}^{10}$

	27	28	29	30	31	32	33	34	35	36	37	38
Carapace . .	30	26	31,5	29	24,5	33	32	31	31	26,5	31,5	24
Rostrum . .	25	26,5	24,5	23,5	25,5	29	29	25,5	26	24	25,5	26,5
Formula . .	$\frac{5}{19}{}^{11}$	$\frac{5}{18}{}^{11}$	$\frac{5}{16}{}^{10}$	$\frac{5}{16}{}^{8}$	$\frac{5}{16}{}^{11}$	$\frac{5}{19}{}^{12}$	$\frac{5}{18}{}^{11}$	$\frac{5}{19}{}^{12}$	$\frac{5}{16}{}^{12}$	$\frac{5}{16}{}^{12}$	$\frac{5}{16}{}^{10}$	$\frac{5}{20}{}^{11}$

N° 1—8 Stat. 12, N° 1—3 males, N° 4—7 ova-bearing females, N° 8 female without eggs; N° 9—16 Stat. 38, all young; N° 17—22 Stat. 74, N° 17 ova-bearing female, N° 18 adult male, N° 19—22 young specimens; N° 23—26 Stat. 139, N° 23, 24 adult males, N° 25, 26 ova-bearing females; N° 27 and 28 females from Stat. 212, the latter with eggs; N° 29—36 Stat. 256, N° 29—31 males, N° 32—34 females with eggs, N° 35 and 36 females without eggs (N° 31 bears a Bopyrid in the left branchial chamber); N° 37 egg-bearing female from Stat. 262; N° 38 egg-bearing female from Stat. 316.

8. *Heterocarpus dorsalis* Bate. Pl. XV, Fig. 43—43*g*.

Heterocarpus dorsalis C. Spence Bate, Report Challenger Macrura, 1888, p. 630, Pl. CXI.
? *Heterocarpus Alphonsi* C. Spence Bate, l. c. 1888, p. 632, Pl. CXII, fig. 1.

? *Heterocarpus alphonsi* A. Alcock, Descript. Catal. Indian Deep-Sea Crustacea, 1901, p. 106.
? *Heterocarpus Alphonsi* Th. R. R. Stebbing, Annals South African Museum, Vol. XV, London, 1914, p. 40.

Stat. 38. April 1. 7° 35′.4 S., 117° 28′.6 E. Bali Sea. 521 m. Bottom coral. 2 males and 4 females, 2 of which are ova-bearing; nearly all the specimens are adult.

Stat. 45. April 6. 7° 24′ S., 118° 15′.2 E. Flores Sea. 794 m. Bottom fine grey mud, with some radiolariae and diatomes. 15 specimens, 7 of which are adult males, the rest young specimens.

Stat. 85. June 17. 0° 36′.5 S., 119° 29′.5 E. Strait of Makassar. 724 m. Bottom fine, grey mud. 2 males, one of which is full-grown, the other of medium size.

Stat. 122. July 17. 1° 58′.5 N., 125° 0′.5 E. North of Menado. 1264—1165 m. Bottom stone. 3 ova-bearing females and 1 male, all of medium size.

Stat. 178. Sept. 2. 2° 40′ S., 128° 37′.5 E. Ceram Sea. 835 m. Bottom blue mud. 2 young specimens.

Stat. 211. Sept. 25. 5° 40′.7 S., 120° 45′.5 E. Entrance of Gulf of Boni. 1158 m. Bottom coarse grey mud, superficial layer more liquid and brown. 1 young specimen.

Stat. 267. Dec. 20. 5° 54′ S., 132° 56′.7 E. Kei-islands. 984 m. Bottom grey mud with a brown upper layer. 1 female without eggs.

Stat. 297. January 27, 1900. 10° 39′ S., 123° 40′ E. East of Rotti. 520 m. Bottom soft, grey mud with brown upper layer. 1 male.

Stat. 300. January 30, 1900. 10° 48′.6 S., 123° 23′.1 E. East of Rotti. 918 m. Bottom fine, grey mud. 1 egg-bearing female.

Stat. 314. Febr. 17, 1900. 7° 36′ S., 117° 30′.8 E. Bali Sea. 694 m. Bottom fine, sandy mud. 26 specimens, viz. 9 adult or almost adult males, 3 adult ova-bearing females and 17 young specimens.

Stat. 316. Febr. 19, 1900. 7° 19′.4 S., 116° 49′.5 E. Bali Sea. 538 m. Bottom fine, dark brown sandy mud. 7 specimens, all adult excepting one, viz. 3 males and 3 females, 2 of which are laden with eggs.

Of this apparently common deep-sea species, that was founded on two females taken by the "Challenger" off Banda Island, no less than 65 specimens were obtained by the "Siboga", full-grown males, ova-bearing females and young individuals of different size, in various parts of the Indian Archipelago. This large and well-preserved material enables me to augment our knowledge of this interesting species.

The 6 specimens from Stat. 38 are full-grown; in the largest male the carapace, measured between the orbital and the posterior margin, proves to be 34,5 mm. long, the rostrum from the orbital margin in a straight line to the apex 32,5 mm., the abdomen 83 mm., entire length 150 mm., in the largest ova-bearing female these numbers are in the same succession 36,5 mm., 36 mm., 92,5 mm. and 165 mm. The carapace, one and a half as long as high, is covered, like the rostrum and the abdomen, with a short tomentum. In the younger male, of which the carapace is 26,5 mm. long, the rostrum is one-fourth longer than the carapace, namely 33 mm., and appears hardly more recurved than in BATE's figure 1 ♀ on Plate CXI; it is armed, both dorsally and ventrally, with 14 teeth, that reach to the tip, gradually decreasing in size; three teeth stand on the carapace, the 1st just in front of the middle, the 3rd just behind the orbital margin and the 2nd tooth is but half as far distant from the 1st as from the 3rd. In the females taken by the "Challenger" only two teeth were placed on the carapace, the 3rd above the eyes and the teeth of the rostrum proper were farther distant from one another than in this male — but in other specimens of this collection, like in those from the Stations

122, 178 and 300, the rostrum agrees with that of the Challenger types. In the larger male the rostrum is $\frac{13}{13}$-dentate, two millimeters shorter than the carapace, as much recurved as in BATE's figure and the 3rd tooth of the gastric carina, which is but little farther distant from the 2nd as the 2nd from the 1st, is placed above the orbital margin. In a female without eggs, in which the carapace is 31,5 mm. long, the rostrum is 34,5 mm. long and a little more recurved than in the figure of BATE, three teeth stand on the carapace, but those of the proximal half of the upper margin are as far remote from one another as in the Challenger types, the 2nd tooth of the rostrum proper being placed opposite the distal extremity of the antennular peduncle; the rostrum is $\frac{11}{13}$-dentate. In the other adult specimens, however, the rostrum is nearly as long as the carapace, more strongly recurved than in the Challenger types. 3 teeth stand on the carapace and the rostral formulae are $\frac{13}{15}$, $\frac{11}{13}$ and $\frac{10}{13}$. The gastric carina is quite conspicuous in this species and (Fig. 43*b*) bears a small tubercle posteriorly, not always distinct, however, just before uniting with the transverse carina that joins the posterior extremities of the post-ocular carinae and that runs parallel with the posterior margin. There is also on the gastric carina a small elongate impression or pit, situated on the cardiac region, twice as far distant from the 1st tooth as from the described terminal tubercle. Like in *Heteroc. laevigatus* Bate one observes, between the posterior extremity of the post-antennal carina and the postero-lateral curved angle of the carapace, a short curved carina that fades away at the level of the coxa of the 5th pair of legs. The orbital spine reaches to the eyes, the strong branchiostegal spine is flattened above, reaches as far forward as the other, sometimes even a little farther and projects beyond the 2nd joint of the antennal peduncle, when the carapace is looked at from above.

Though the 1st and 2nd abdominal terga are described as smooth, it should, however, be remarked that the 1st tergum (Fig. 43*c*) carries a transverse row of four more or less prominent, small tubercles, two on each side of the middle; these four prominences are not mentioned by SPENCE BATE, nor visible even in his magnified figure 2, but two small similar prominences, that occur on each side of the 2nd somite, there where the tergum passes into the pleura, are distinctly visible in the figure 1 ♀. Concerning the following somites, it should be remarked that the carina of the 3rd tergum is longitudinally fluted and that it is not regularly arched in a lateral view, like in BATE's figure 1 ♀, but that the anterior half makes a very obtuse angle with the posterior, which angle, however, is rounded and not dentiform as in *Heteroc. hostilis* Faxon and *affinis* Faxon from the west coast of Central America, and furthermore that the three spines slightly increase in length from the spine of the 3rd to that of the 5th tergum. Exclusive of the spine the 5th tergum measures two-thirds the length of the 6th, but inclusive of it the 6th tergum appears but little longer than the 5th, while the telson is as long as the 6th and the 5th somite combined, the latter without the spine; 6th somite and telson dorsally grooved, telson with 3 pairs of dorso-lateral spinules besides those at the tip, telson as long as the uropods.

The stylocerite which is acuminate and provided with a basal process, reaches to the middle or almost to the middle of the 2nd antennular article, 3rd article a little shorter than 2nd; inner flagellum of the adult female as long as carapace and rostrum combined, outer a little shorter.

Scaphocerite (Fig. 43*a*) a little more than half as long as the carapace and 3-times as long as wide, outer margin slightly convex, for the rest resembling BATE's figure *c*: in the larger male the carapace is 34,5 mm. long, the scaphocerite 20 mm. long and 6,7 mm. broad, in an adult ova-bearing female these numbers are 36,5 mm., 22,2 mm. and 7,1 mm. Antennal flagellum of the adult male 300 mm. long, twice as long as the body.

The external maxillipeds reach nearly, both in the male and in the female, as far forward as the antennal scale. According to SPENCE BATE the exopodite should be reduced to a tubercle, in these specimens, however, a very short, rudimentary exopodite really occurs, measuring $^1/_7$ or $^1/_8$ the length of the long antepenultimate joint: in one of the ova-bearing females it is wanting on the left side, which fact indicates that this appendage is sometimes worn off or lost, as was evidently also the case in the two females taken by the "Challenger". Peraeopods of the 1st pair a little shorter than the external maxillipeds, reaching by the carpus as far forward as the antennal peduncle. Shorter leg of the 2nd pair, either on the right or on the left side, little longer than the antennal peduncle; carpus 11-jointed, 1st joint as long as 2nd and 3rd combined, 3rd one and a half as long as 2nd, 4th nearly as long as 3rd, 5th—10th short, equal, a little shorter than 2nd, last joint as long as 1st; fingers a little shorter than the palm, which is slightly broader than the last joint of the carpus. The other slender leg appears, in the larger male, as long as the external maxillipeds, while in the adult ova-bearing female it projects by the chela and one-sixth of the carpus beyond the antennal scale; the carpus consists in the larger male of 26, in the adult females of 29—34 joints, 1st and last joint a little longer than the others, chela as long as the two last joints combined, not broader than carpus, fingers as long as the palm. The legs of the 3rd pair reach by the whole length of the dactyli or hardly more beyond the tip of the antennal scale, the 4th are a little shorter, those of the 5th pair are again a little shorter and extend to the far end of the propodi of the 3rd pair. The dactyli are slender, long, and measure two-fifths to one-third of the propodi, in adult specimens.

In two of the 7 adult males from Stat. 45 the rostrum is broken at the tip. Three teeth stand on the carapace or the 3rd above the orbital margin and always the 2nd is placed nearer to the 1st than to the 3rd. In these adult males the rostrum is just as long as the carapace or a little longer, in one specimen (N° 9 of the Table), however, slightly shorter and in all these males it is as much turned upwards as in the Challenger type or hardly more, but not so strongly recurved as in the adult females from Stat. 38. In the younger specimens the rostrum is comparatively longer, like in other species, in N° 12 the carapace is 26 mm. long, the rostrum 32 mm., in younger ones it is one and a half as long as the carapace and in the two youngest individuals, of which the carapace measures 9 mm., the rostrum is more than twice as long; in these young individuals it is a little more upturned than in BATE's figure and the teeth, especially those of the upper margin, are comparatively longer and slenderer than in the adult animal. Even in the youngest individuals the anterior half of the carina of the 3rd abdominal somite appears already grooved, while on the 1st tergum the 4 tubercles are already visible.

The larger male from Stat. 85 is 154 mm. long, rostrum one-fifth longer than the carapace, as much recurved as in BATE's figure, in the other it is somewhat more recurved;

while in the former 3 teeth stand on the carapace, in the younger male the 3rd tooth is placed above the orbital margin. In both the subterminal tubercle of the carapacial carina is present.

The youngest of the three ova-bearing females, taken north of Menado, is of much interest, not only on account of its small size, this specimen being only 113 mm. long, so that we may conclude that at this age *Heteroc. dorsalis* bears already eggs, but also on account of the following. The slender, tapering and pointed rostrum, a little more than one and a half as long as the carapace, is as much upturned as in the Challenger type and, like in BATE's female, the 3rd tooth is placed above the eye, a little in front of the orbital margin, but the 2nd tooth is almost twice as far distant from the 3rd as from the 1st; in one of the two other ova-bearing females that are of equal size, the 3rd tooth stands just beyond the orbital margin, but the 2nd is placed midway between the 1st and the 3rd, in the male, however, the 3rd tooth is placed like in the youngest female and the 2nd is almost one and a half as far distant from the 3rd as from the 1st. In these specimens the teeth of the upper margin are as far distant from one another as in the Challenger type.

Of the larger specimen from Stat. 178 the carapace is 18,5 mm. long, the rostrum is incomplete, but the proximal teeth of the upper margin stand like in the Challenger type and the 2nd tooth is hardly farther distant from the 3rd above the eye than from the 1st; in this specimen the branchiostegal spine reaches not so far forward as the orbital spine, though beyond the 2nd joint of the antennal peduncle. In the other specimen the rostrum is twice as long as the carapace and the 3rd tooth stands also just beyond the orbital margin; the 4 tubercles on the 1st abdominal somite are already present. In the very young individual from Stat. 211 the rostrum is more than twice as long as the carapace, little upturned and 3 teeth stand on the latter; like in other young specimens the foremost tooth of the upper margin is placed not far from the extremity of the rostrum, almost 4-times as far distant from the penultimate as from the extremity and so small that it may easily be overlooked.

The rostrum of the female of medium size from the Kei-islands is strongly recurved and a little more than one-third longer than the carapace; three teeth on the carapace, the 4th just beyond the orbital margin. Dactyli of 3rd legs almost half as long as the propodi (4 mm., 8,5 mm.).

The male from Stat. 297 is almost full-grown. Of the 14 teeth of the moderately upcurved rostrum three stand on the carapace, the 2nd midway between the 1st and the 3rd and the two foremost teeth are rudimentary, almost invisible. Dactyli of the three posterior legs almost half as long as the propodi, those of the 3rd pair 4,5 mm. long, the propodi 10,5 mm.

The egg-laden female from Stat. 300 (Fig. 43*f*) is also nearly full-grown, the rostrum closely resembles that of the Challenger type; 3rd tooth above the eye, twice as far distant from the 2nd as the 2nd from the 1st, teeth of the upper margin as far distant as in BATE's female, foremost tooth near apex rudimentary. Also as regards the proportion between the length of carapace and rostrum, which is according to SPENCE BATE like 5 : 7, this female agrees with the type. (It was, of course, a slip of the pen, when 80 mm. (3,1 inch) were indicated as the entire length, while carapace, rostrum and abdomen are described as 25 mm., 35 mm. and 55 mm. long.)

The numerous specimens from Stat. 314 resemble those from the Stations 38 and 45, the rostrum being moderately recurved in the adult males, more strongly in the adult ova-bearing females; in these adult specimens it is nearly as long as the carapace, or a little to one-third longer, or, as in the adult ova-bearing female (N° 37) slightly shorter, in the younger specimens one and a half to twice as long.

The adult male (N° 47) from Stat. 316 differs from all the other specimens by the small number of teeth on the rostrum and should be considered as an exception. The rostrum, a little shorter than the carapace, is very little upturned, so that the apex is situated at the same level as the carapace. There are but 7 teeth on the upper margin, besides a rudimentary tooth in front of the foremost one; 3 teeth stand on the carapace, the 2nd twice as far from the 3rd as from the 1st, while the 7th is placed a little behind the tip of the antennal scale; lower margin only with 6 teeth. In the much younger male (N° 48) also only 9 teeth are observed both on the upper and the lower margin, the teeth are as far distant from one another as in BATE's figure 1 ♀, but the rostrum is a little more upturned and, as usual, 3 teeth stand on the carapace, the 2nd twice as far from the 3rd as from the 1st; it is one-fourth longer than the carapace. In the females the rostrum is more strongly recurved than in the Challenger type, in the largest female one-fourth longer than the carapace.

We may conclude from the measurements of 53 specimens, which are indicated in the Table, that in adult individuals of *Heteroc. dorsalis* Bate the rostrum is nearly as long as the carapace, either a little shorter or longer, or distinctly longer, to almost one and a half as long as the carapace and that in younger specimens it appears considerably longer, to even a little more than twice the length of the carapace. The Table also teaches us, that the rostrum is usually armed dorsally with 12—14, ventrally with 11—14 teeth, more rarely 10 or 11 teeth occur on the upper margin, and, as very rare exceptions, 7 or 9 or 15 or 16 teeth were observed on the upper margin, 6 or 8 or 9 or 15 on the lower. The two females from off Banda Island, on which this species was founded by SPENCE BATE, should therefore be regarded as such a rare exception, because the upper margin was armed with 8 and the lower with 7 teeth. Usually three teeth stand on the carapace, posterior to the orbital margin, about in 80 per cent of the specimens, more rarely two and in this case the 3rd tooth is often placed above the orbital margin: specimens, however, in which, like in the Challenger types, the 3rd tooth stands above the eyes, were also obtained by the "Siboga". As a conspicuous and constant feature of this species the four tubercles must be considered, which in a transverse row occur on the tergum of 1st abdominal somite.

I am not quite sure, whether *Heteroc. Alphonsi* Bate, taken by the "Challenger" south of the Philippines and off Japan, is a distinct species or not. According to the author of the Report on the Challenger Macrura the rostrum should be one and three-fourths longer than the carapace, but the measurements of the female and the male, mentioned by him on p. 633, agree with those of *Heteroc. dorsalis*, the rostrum being only one-third or one-fourth longer than the carapace — they show likewise the same slip of the pen, for the entire indicated length is only the length of the rostrum and the abdomen combined! In BATE's description

the orbital spine is described as "a strong tooth", and then follows "the infero-lateral angle is also armed with a short tooth", and on p. 634 it says that this "short" tooth is long! It is also remarkable that the author compares both *Heteroc. dorsalis* and *Heteroc. Alphonsi* with *Heteroc. oryx* A. M.-Edw., but not inter se, and one becomes inclined to think that the descriptions of the two species have been made a long time after one another and that the author, when describing the second species, had forgotten the description of the former. I not succeed in finding any good character, by which *Heteroc. Alphonsi* should differ from *Heteroc. dorsalis*. Nevertheless, according to ALCOCK, the rostrum of *Heteroc. Alphonsi* should measure indeed "about $1^3/_4$-times the length of the carapace proper" in the adult animal and it should be armed dorsally with nine or ten teeth, two of which should stand on the carapace, and ventrally with ten to thirteen, but for the rest also ALCOCK's description mentions no character, by which both forms could be distinguished. *Heteroc. Alphonsi* Bate must therefore probably be considered as a variety of *Heteroc. dorsalis*, distinguished by the longer rostrum and by the upper margin being as a rule only armed with 9 or 10 teeth, two of which stand on the carapace.

Table of Measurements in millimeters.

	1	2	3	4	5	6	7	8	9	10	11
Length of carapace	34,5	26,5	36,5	35,5	36	31,5	34	32,5	32	31	29,5
Length of rostrum.	32,5	33	36	36	36,5	34,5	34	32,5	30,5	34	35
Rostral formula	$\frac{2}{13}/\frac{13}{13}$	$\frac{3}{14}/\frac{14}{14}$	$\frac{3}{13}/\frac{15}{15}$	$\frac{3}{11}/\frac{13}{13}$	$\frac{3}{16}/\frac{13}{13}$	$\frac{3}{11}/\frac{13}{13}$	$\frac{2}{12}/\frac{11}{11}$	$\frac{3}{10}/\frac{11}{11}$	$\frac{3}{12}/\frac{13}{13}$	$\frac{2}{13}/\frac{11}{11}$	$\frac{3}{14}/\frac{14}{14}$

	12	13	14	15	16	17	18	19	20	21	22
Length of carapace	26	22,5	20,5	16,5	13	9	8,5	32,5	27	25	24,5
Length of rostrum.	32	33	30,5	31,5	24	23	18	38,5	37,5	34	36,5
Rostral formula	$\frac{3}{15}/\frac{15}{12}$	$\frac{3}{14}/\frac{14}{14}$	$\frac{3}{11}/\frac{12}{12}$	$\frac{3}{12}/\frac{13}{13}$	$\frac{3}{13}/\frac{12}{12}$	$\frac{2}{13}/\frac{14}{14}$	$\frac{2}{10}/\frac{11}{11}$	$\frac{3}{14}/\frac{13}{13}$	$\frac{2}{13}/\frac{14}{14}$	$\frac{2}{10}/\frac{11}{11}$	$\frac{3}{11}/\frac{12}{12}$

	23	24	25	26	27	28	29	30	31	32	33
Length of carapace	21	11	9,5	21	27,5	28,5	32	32	31	31	30,5
Length of rostrum	35,5	22,5	21	29,5	35	40,5	31,5	32,5	32	33	34
Rostral formula	$\frac{2}{10}/\frac{13}{13}$	$\frac{2}{10}/\frac{12}{12}$	$\frac{3}{10}/\frac{12}{12}$	$\frac{3}{14}/\frac{15}{15}$	$\frac{3}{14}/\frac{12}{12}$	$\frac{2}{11}/\frac{11}{11}$	$\frac{3}{12}/\frac{14}{14}$	$\frac{3}{14}/\frac{13}{13}$	$\frac{3}{12}/\frac{12}{12}$	$\frac{3}{13}/\frac{12}{12}$	$\frac{3}{14}/\frac{14}{14}$

	34	35	36	37	38	39	40	41	42	43	44
Length of carapace	29,5	28,5	27	32,5	21	17	19	18,5	18,5	16	16
Length of rostrum.	34,5	35,5	36,5	30	31,5	28	29,5	27	29	29,5	27
Rostral formula	$\frac{3}{13}/\frac{13}{14}$	$\frac{3}{14}/\frac{14}{13}$	$\frac{3}{12}/\frac{12}{12}$	$\frac{3}{10}/\frac{10}{8}$	$\frac{3}{14}/\frac{14}{13}$	$\frac{3}{12}/\frac{12}{14}$	$\frac{3}{12}/\frac{12}{14}$	$\frac{3}{14}/\frac{14}{14}$	$\frac{3}{13}/\frac{13}{14}$	$\frac{3}{14}/\frac{14}{13}$	$\frac{3}{14}/\frac{14}{14}$

	45	46	47	48	49	50	51	52	53
Length of carapace	14,5	13	34	27	27	20,5	30	28,5	27,5
Length of rostrum.	26,5	25,5	32	34,5	34,5	35	37,5	33	35
Rostral formula.	$\frac{3}{14}/\frac{14}{14}$	$\frac{3}{13}/\frac{14}{14}$	$\frac{3}{7}/\frac{6}{6}$	$\frac{3}{9}/\frac{9}{9}$	$\frac{3}{13}/\frac{14}{14}$	$\frac{3}{13}/\frac{11}{11}$	$\frac{3}{14}/\frac{12}{12}$	$\frac{3}{11}/\frac{11}{11}$	$\frac{3}{12}/\frac{11}{11}$

N° 1—6 Stat. 38, N° 1 and 2 males, N° 3—6 females, N° 3 and 4 with eggs; N° 7—18 Stat. 45, N° 7—11 adult males, the rest young; N° 19 and 20 Stat. 85; N° 21—23 ova-bearing females from Stat. 122; N° 24 Stat. 178; N° 25 Stat. 211; N° 26 Stat. 267; N° 27 Stat. 297;

N° 28 Stat. 300; N 29—46 Stat. 314, N° 29—36 adult males, N° 37 adult ova-bearing female, the rest young; N° 47—53 Stat. 316, N° 47—50 adult males, N° 51—53 adult females, N° 51 and 52 with eggs.

General distribution: Off Banda Island (Bate).

Heterocarpoides de Man.

Heterocarpoides nov. subg. J. G. de Man, in: Zoologische Mededeelingen, uitgegeven vanwege 's Rijks Museum van Natuurlijke Historie te Leiden, Deel III, Afl. 4, December 1917, p. 284.

It appears rather beyond a doubt that *Dorodotes levicarina* Bate, a species found in the Arafura Sea, south of Papua, has originally been referred by Spence Bate to the genus *Heterocarpus* A. M.-Edw. and that, owing to an incomprehensible mistake and error, it has afterwards been described by him as a species of the genus *Dorodotes*. In the first place the description of this genus on p. 677 of the Report on the Challenger Macrura is only applicable to *Dor. reflexus* Bate, but not to *Dor. levicarina*, because both carapace and abdomen are described as smooth, i. e. non carinate, and the ophthalmopod as small and uniarticulate, while in *Dor. levicarina* carapace and abdomen are carinate and the eyestalk resembles that of the genus *Heterocarpus*; in the second place the author remarks at the end of the page "I only know of one species of this genus etc.", furthermore we read in his description of *Dor. levicarina* (p. 681) "the dorsal carina is likewise less conspicuous than in the typical forms of the genus", where the word "forms" can only refer to the numerous species of the genus *Heterocarpus* and, finally, *Dor. levicarina* has been figured on the same plate with the other species of that genus. *Dorodotes levicarina* indeed in all characters agrees with the genus *Heterocarpus*, excepting only the legs of the second pair, which are equal and only composed of six joints, the 1st of which is nearly as long as the following together, the 2nd—5th, however, very short and equal; it differs, moreover, from all known species of the genus *Heterocarpus* by the characteristic carination of the carapace, the post-antennular carina running uninterruptedly from near the posterior margin to the orbital spine, the post-antennal carina wanting entirely, while of the post-ocular carina only the posterior half is developed, that curves downward and unites with the post-antennular on the hepatic region. It agrees therefore both with *Heteroc. ensifer* A. M.-Edw. and *Heteroc. Wood-masoni* Alcock in the possession of the post-antennular carina, but it differs from the former by the suppression of the post-antennal and from the latter by the posterior half of the post-ocular carina being developed; like in *Heteroc. ensifer* the post-ocular carina curves also downward towards the post-antennular.

The subgenus *Heterocarpoides* is therefore proposed for this species.

9. *Heterocarpus (Heterocarpoides) levicarina* (Bate). Pl. XV, Fig. 44—44*f*.

Dorodotes levicarina C. Spence Bate, Report Challenger Macrura, 1888, p. 680, Pl. CXII, fig. 5.
Dorodotes levicarina J. R. Henderson, A contribution to Indian Carcinology, 1893, p. 436.
Dorodotes levicarina H. Balss, Die Decapoden des Roten Meeres. I. Macruren. Wien 1915, p. 20.

Stat. 47. April 8/12. Bay of Bima, near south fort. 13—31 m. Bottom mud with patches of fine coral sand. 1 young specimen.

Stat. 164. Aug. 20. 1°42'.5 S., 130°47'.5 E. Between the islands of Misool and Salawatti. 32 m Bottom sand, small stones and shells. 1 young specimen.

Stat. 306. Febr. 8, 1900. 8°27' S., 122°54'.5 E. Lobetobi Strait. 247 m. Bottom sandy mud. 1 specimen of medium size without eggs and 1 still younger specimen.

Stat. 312. Febr. 14, 1900. 8°19' S., 117°41' E. Saleh-bay. 274 m. Bottom fine, sandy mud. 6 adult specimens, 3 of which are ova-bearing.

SPENCE BATE describes the rostrum as half as long as the carapace, but, according to the measurements mentioned by him and according to the figure, the rostrum measures three-fourths the length of the carapace. In the young specimen from Stat. 164 the carapace is 6,7 mm. long, the rostrum, measured from the orbital margin to the apex, 5,25 mm., the proportion between both being the same as in the typical species; the rostrum, that just reaches beyond the antennal scale and that, though slightly ascending, does not extend above the level of the carapace, is armed dorsally with 10, ventrally with 4 teeth. In BATE's figure the teeth, in which the 4th and 5th abdominal terga terminate, appear very small, much smaller than the tooth of the 3rd tergum: as regards this character the specimen from Stat. 164 fully resembles the type.

In all the other specimens, however, that were collected in the more western parts of the Archipelago, the teeth of the 4th and 5th terga are a little larger in proportion to the tooth of the 3rd tergum and in all these specimens the rostrum is a little longer than the carapace and has a more slender form. In the young specimen from Stat. 47 the rostrum is broken off just beyond the antennal scale, so that its length cannot be indicated; the carapace is 7,1 mm. long. In this specimen the carinae on the carapace are more conspicuous than in the others; the post-antennular carina runs quite distinctly from near the posterior margin uninterruptedly to the orbital spine, while the posterior half of the post-ocular becomes rather indistinct distally, there where it curves towards the other. In the larger specimen from Stat. 306 the carapace is 8,5 mm. long, the rostrum 9 mm.; the rostrum which reaches by two-fifths of its length beyond the antennal scale and which is rather much upturned above the level of the carapace, is $\frac{10}{4}$-dentate; the carapace of the young individual is only 4,4 mm. long, the rostrum is broken off near the tip of the antennal scale.

The 6 specimens from Stat. 312 are almost full-grown, the length of the carapace varies between 10 mm. and 10,7 mm., the length of the rostrum between 10,25 mm. and 12,2 mm.; in the specimen without eggs, of which the carapace is 10,25 mm. long, the rostrum 12,2 mm., the latter is $\frac{12}{6}$-dentate, reaches by two-fifths its length beyond the antennal scale and is distinctly turned upward above the level of the carapace; in the four other females the rostrum is $\frac{11}{5}$, $\frac{10}{4}$, $\frac{12}{4}$ and $\frac{14}{5}$-dentate, while in the last specimen it is broken off. We may therefore conclude, that the number of dorsal teeth varies from 9 to 14, for in one of the two individuals, from the Red Sea, mentioned by Dr. BALSS (l. c.), the upper margin was only armed with 9 teeth; the lower margin bears 4 to 6 teeth, in the specimen from the Red Sea only 2 were observed. Usually four teeth stand on the carapace, the 5th above the orbital margin; in one of the specimens from Stat. 312, the rostrum of which is $\frac{14}{5}$-dentate, five teeth were placed on the carapace and in the larger specimen from Stat. 306 only three stood behind the orbital margin, the 4th being placed just above it. In all these specimens from Stat. 312 the lateral carinae

of the carapace are little distinct, especially the post-antennular, though in a dry condition they are appreciable, as SPENCE BATE has already remarked.

As regards the appendages I may add the following. The scaphognathite (Fig. 44*a*) is broadly rounded posteriorly. In the ova-bearing female the external maxillipeds reach to the obtuse tip of the antennal scale, their exopodite is well-developed and extends to beyond the middle of the antepenultimate joint. The legs of the 1st pair (Fig. 44*b*) are much shorter, reaching only to the far end of the antennal peduncle, while those of the 2nd (Fig. 44*c*, 44*d*, 44*e*) are as long as the external maxillipeds; the peraeopods of the 3rd pair extend by the dactyli beyond the antennal scale, the following gradually diminish in length, so that the 5th pair do not yet reach to the tip of the scale. The propodi (3,9 mm.) of the 3rd legs (Fig. 44*f*) are nearly twice as long as the carpus (2 mm.) and the dactyli (1,85 mm.) are almost half as long as the propodi, that are very slender and slightly curved. Following legs like the third.

Epipodites on all the peraeopods well-developed, except on the last pair.

The form from the western Indian Archipelago should perhaps be distinguished as a variety *longirostris* from the typical species, that occurs in the Arafura Sea and in the seas south of New Guinea: I do not venture to decide this question, because only one young specimen of the typical species has been collected.

General distribution: Arafura Sea, near Torres Strait (SPENCE BATE); Gulf of Martaban (HENDERSON); Red Sea (BALSS).

Chlorotocella Balss.

1. *Chlorotocella gracilis* Balss. Pl. XV, Fig. 45, 45*a*.

Chlorotocella gracilis H. Balss, Ostasiatische Decapoden II. Die Natantia und Reptantia. München 1914, p. 33, fig. 16—22.

Stat. 7. March 11. 7° 55′.5 S., 114° 26′ E. Reef of Batjulmati (Java). 2 specimens.
Stat. 164. August 20. 1° 42′.5 S., 130° 47′.5 E. Between the islands of Misool and Salawatti. 32 m. Bottom sand, small stones and shells. 2 specimens.

The two specimens from Stat. 164 are not yet adult and bear no eggs. The carapace of the larger is 3,7 mm. long, the rostrum 6,2 mm., 5th abdominal somite 1,25 mm., 6th 2,8 mm., telson 2,8 mm.; in the other the rostrum is broken off at the far end of the basal antennular article, the carapace is 3,55 mm. long, the 5th abdominal somite 1,2 mm., 6th 2,84 mm., telson 2,6 mm. The rostrum of the larger specimen is therefore a little more than one and a half as long as the carapace and agrees with the figure 16 of the quoted paper. We read in it about the carapace: "von Stacheln sind nur der Antennal- und der Branchiostegaldorn vorhanden", the carapace, however, is also armed with a well-developed supraorbital spine; the three spines are nearly of the same size. In Fig. 17 of the original paper the supraorbital spine is figured, but it has been omitted in Fig. 16. The outer orbital angle appears as a prominent truncate process, that is somewhat narrowed at its base. With regard to the abdomen I would remark, that the terga both of the 4th and of the 5th somite (Fig. 45*a*) are armed on their posterior margin at each side with a spine and that there is also a spine on the posterior margin of the pleura of the 5th somite; the two first mentioned spines are of the same size, the last

mentioned is a little smaller. BALSS does not describe them and in his figure 16 only the spine on the posterior margin of the 5th somite has been drawn. In the larger specimen the telson is a little shorter than the 6th somite, in the other both have the same length; it is armed with 8 pairs of small marginal spines, that slightly increase in length posteriorly and the foremost of which is placed at the anterior third and at the level of the anterior spine one observes moreover a submedian pair of spines. In the younger specimen the telson is nearly as long as the exopodite of the tailfan, in the other it is a little shorter.

The 3rd article of the antennular peduncle is armed above with a spine. The antennal scale measures two-thirds the length of the carapace and is 2,4 mm. long, in both specimens. The legs of the 3rd and 4th pair are of the same length and show the same measurements, in both legs the carpus (in the younger specimen) is 1,16 mm. long, the propodus 1,6 mm., almost one and a half as long as the carpus, the slightly curved and unarmed dactylus 0,44 mm., little more than one-fourth the length of the propodus; the carpus of the 5th leg is 1,3 mm. long, the propodus 1,66 mm., the dactylus 0,44 mm., so that in these legs the propodus is hardly one-third longer than the carpus.

The two specimens from Stat. 7 are a trifle larger than the preceding, their carapace being just 4 mm. long. In these specimens, which for the rest agree with those from Stat. 164, one observes on the posterior half of the 3rd tergum, at either side of the mid-dorsal line and close to it, a short longitudinal groove or impression; the two grooves do not extend to the posterior margin, but, converging backward, unite together, so that that part of the upper surface which is limited by them, looks like a shield, with sharp lateral margins and acute posterior extremity. In the specimens from Stat. 164 the two grooves are still hardly discernible.

General distribution: Sagami Bay, Dzushi, Enoshima (Japan) (BALSS).

Chlorotocus A. M.-Edw.

The genus *Chlorotocus*, established by A. MILNE-EDWARDS in the "Rapport sur les travaux de la Commission pour la faune sous-marine. Paris, 1882, p. 18", on a species obtained July 27, 1881, by the "Travailleur" in the Gulf of Gascony and named by him *gracilipes*, but which species, as was pointed out by SENNA in 1904, is identical with *Pandalus crassicornis* from the Gulf of Naples, described by A. COSTA in 1871, contains at present four species and one variety. *Chlorotocus crassicornis* (A. Costa) occurs throughout the whole Mediterranean (Cyclades, Sporades, Ligurian Coast, Gulf of Naples), the Adriatic and the Gulf of Gascony; it has, however, also been observed off the coast of the Cape colony and of Natal, while a variety *andamanensis* Anderson was taken by the "Investigator" in the Andaman Sea. *Chlorot. incertus* Bate is known from the Agulhas Bank, off the Cape of Good Hope; a specimen from the Sagami Bay, Japan, was referred by Dr. BALSS with some doubt to the same form. The third species is the remarkable *Chlorot. spinicauda* de Man, which represents the genus in the Indian Archipelago, while the last is *Chlorot. Novae-Zealandiae* (Borr.), which has been discovered a few years ago by the british "Terra Nova" Expedition off the North Cape, New Zealand, and which was at first wrongly referred to the genus *Thalassocaris* Stimps.

Chlorot. spinicauda is found in rather shallow water between 30 and 51 fathoms and seems to be a rare species; *Chlorot. incertus* was taken at a depth of 150 fathoms, *Chlorot. crassicornis*, the type species, from 80 to 326 fathoms, the variety *andamanensis* at 185, *Chlorot. Novae-Zealandiae* (Borr.), finally, at a depth of 70 fathoms.

1. *Chlorotocus spinicauda* de Man. Pl. XV and XVI, Fig. 46—46*c*.

Chlorotocus spinicauda J. G. de Man, in: Abhandl. Senckenb. Naturf. Gesellschaft, Bd. 25, 1902, p. 856, Taf. XXVI, Fig. 59—59*h*.

Stat. 51. April 19. Madura-bay and other localities in the southern part of Molo-strait. 54—90 m. Bottom fine grey sand; coarse sand with shells and stones. 1 full-grown, egg-laden female.

Stat. 153. August 14. 0° 3'.8 N., 130° 24'.3 E. N.W.-coast of Waigeu-island. 141 m. Bottom fine and coarse sand with dead shells. 1 young male.

Stat. 204. Sept. 20. 4° 20' S., 122° 58' E. Between islands of Wowoni and Buton. From 75—94 m. Bottom sand with dead shells. 1 male.

The specimens from the Stations 51 and 204 perfectly agree with the detailed description [1]) of the specimen from Ternate, described in 1902, except in some particulars owing to their full development; the specimen from Ternate was very young, as I already suggested in 1902, but the male from Stat. 204 is 25 mm. long and the egg-laden female from Stat. 51 measures nearly 36 mm. from apex of rostrum to tip of telson. Carapace and rostrum, taken together, are in these adult specimens a little shorter than the abdomen: in the male the carapace measures 6 mm., the rostrum 4,9 mm., the abdomen 14 mm., in the female these numbers are, in the same succession, 8 mm., 6,75 mm. and 20,85 mm. While the carapace of the male resembles the figure 59 of the original description, as regards the proportion between length and height, the carapace being in the male from Stat. 204 6 mm. long and 4,9 mm. high, in the large full-grown female the carapace appears comparatively much higher, namely 8 mm. long and 7,5 mm. high. Owing to the greater height of the carapace the upper border of the rostrum appears in the full-grown female more strongly turned downward than in the young specimen from Ternate and the male from Stat. 204, but the lower margin runs like in these specimens; both in the male and in the female the rostrum is $\frac{4}{5}$-dentate and in both the 3rd tooth stands above the orbital margin; also, as regards the general form, the rostrum resembles the figures 59 and 59*a*. The small tubercle on the middle of the upper border of the carapace is in the female quite distinct and there is another similar, small tubercle at the base of the 1st tooth; in the male both tubercles are less developed. Behind the tubercle the cardiac region appears a little uneven, more distinctly in the larger female than in the male. In both specimens the orbital spine reaches to the cornea of the eyes and is much longer than the branchiostegal spine, which is not carinate: according to the original description in the young specimen from Ternate this spine should have been carinate.

Antero-inferior angle of carapace rounded, lower margin carinate.

1) This description contains two clerical errors: p. 857, line 14 from above, for "zweiten", read "sechsten"; p. 858, line 10 from above, for "vierte" read "fünfte".

The abdomen of the male accords with the original description, but the median spine on the posterior margin of the 6th somite is only half as long as the lateral and this is also the case in the female. The abdomen of the female differs, moreover, from that of the male by the strong development of the pleura of the 1st and 2nd somite and by the reduction of their spines, that are very small, much smaller than in the male. While in the male the anterior margin of the pleura of the 1st somite is straight or, like in the young specimen from Ternate, even slightly concave and does not reach over the carapace, in the female the pleura of the 1st somite are strongly curved anteriorly, covering the adjacent part of the carapace; the 3rd and following somites agree with those of the male.

The ocellus on the eyestalk of *Chlorot. incertus* is described as independent, in *Chlorot. spinicauda* it is not circular but oval and transverse and its anterior margin lies against the cornea; the cornea is distinctly broader and nearly as long, though not shorter than the rest of the ophthalmopod; in the type species, *Chlorot. crassicornis*, an ocellus is wanting.

The antennular flagella are subequal and a little longer than the carapace; the thickened part of the outer flagellum reaches almost to the tip of the antennal scale. The antennal flagellum of the male, though not quite complete, is 20 mm. long and will, no doubt, once prove to be as long as the body.

The molar process of the mandible (Fig. 46*a*) of the male is truncate at the tip, the margins are not toothed, but somewhat lobate; the incisor process terminates in 5 acute teeth, of which the two lateral are twice as large as the three others that are equal. The palp is (Fig. 46*b*) three-jointed, like in *Chlorot. crassicornis* (Th. R. R. Stebbing, South African Crustacea, Part VII, 1914, p. 42, Pl. XI, fig. *m*); the 1st or basal joint is 0,5 mm. long, the 2nd 0,22 mm., half as long as the 1st, the 3rd or terminal 0,63 mm., nearly 3-times as long as the 2nd. The joints are flattened, the 3rd about $2^1/_2$-times as long as wide at base, narrowing regularly to the obtuse tip and the margins are fringed with setae. Stebbing (l. c.) remarks, that the incisor process of the mandible of *Chlorot. incertus* was figured by Spence Bate (Challenger Macrura, Pl. CXVI, Fig. 1*d*) as a sort of stiletto: concerning this I would say, that in a certain position of the mandible this process shows the same form in *Chlorot. spinicauda*, when namely the incisor is looked at from the lateral edge.

The emarginate tip of the palp of the 1st maxilla (Fig. 46*c*) bears at one angle two setae of unequal length, at the other angle one; the middle branch shows a characteristic notch or incision, but seems to have been damaged by the operation; the third branch is curved and fringed with stiff setae, partly feathered and spiniform.

Unfortunately, also in consequence of the operation, the posterior half of the scaphognathite has been cut off; of the two inner distal lobes that project far beyond the basal lobe, the anterior is one and a half as long as the posterior and rounded anteriorly.

The second maxillipeds (Fig. 46*d*, 46*e*) differ from those of *Chlorot. crassicornis* and *incertus* by the shape of the 7th or terminal joint. While in these two species it is applied as a strip along a great part of the outer margin of the 6th, in *Chlorot. spinicauda* the 7th joint is attached near the posterior extremity of that margin, its length being hardly one-fourth

the length of the 6th and the terminal joint is but little broader than long; the outer margin both of the 6th and the 7th joint is fringed with spiniform setae.

The external maxillipeds reach in the adult female to the distal fourth of the antennal scale; the well-developed exopodite reaches in the male almost to the middle of the penultimate joint; the terminal joint is a little more than 3-times as long as the penultimate, the proportion being like 10 : 3, just as in the young specimen from Ternate. All the described mouth-parts are taken from the left side of the male.

Excepting the 5th pair all the legs bear well-developed epipodites. The legs of the 1st pair are as long as in the young specimen from Ternate, but the 2nd pair extend to the apex of the antennal scale; in the female the 2nd joint of the carpus is $2^1/_2$-times as long as the 1st, the chela one-fourth shorter than the carpus and the palm one and a half as long as the fingers. The dactylus ends in two curved claws, that embrace the single claw of the immobile finger, when the fingers are shut; at the base of the claw of the immobile finger one observes, at the inner side, a very small tooth or spine.

The three posterior legs diminish considerably in length from the 3rd to the 5th and they are comparatively just as long as in the young specimen from Ternate, the 3rd pair reaching to the end of the external maxillipeds, the 5th to the anterior margin of the carapace. They agree with the original description, but, owing to these specimens being full-grown, they bear a somewhat larger number of spines and setae. The merus of the 3rd pair is armed, in the female, on the middle third of its posterior margin with 4 stout spines, that increase in length from the posterior to the anterior and the posterior is a little farther distant from the 2nd as the 2nd from the 3rd and as the 3rd from the 4th; a 5th spine, as long as the 4th, occurs just behind the distal extremity. A spine, as long as the 5th of the merus, occurs, besides 3 or 4 smaller ones, at the far end of the lower margin of the carpus and a smaller spine stands on the middle of the posterior margin. The posterior margin of the propodus is armed with 13 spines of somewhat unequal length, that are of a more slender form than those of the merus and at the base of each 2 or 3 setae are implanted, a few spines and setae are implanted on the lateral surface near the posterior margin and 7 or 8 similar spines occur on the anterior margin, also accompanied by a few setae; the dactylus, finally, has 5 spines on its posterior margin. The legs of the 4th pair agree with those of the 3rd, as regards the number of spines and setae. The merus of the 5th pair carries 2 spines in the middle, a third near the proximal and a fourth near the distal extremity, carpus as in the preceding legs; there are 14 slender spines on the posterior margin of the propodus and 3 or 4 on that of the dactylus. In the 2nd pleopods of the male both the stylamblys and the appendix masculina are well-developed.

Eggs not very numerous, rather large, oval, 0,8—0,9 mm. long.

The male from Stat. 153 is hardly longer than the male from Ternate, carapace and rostrum being together 7,6 mm. long; it fully resembles it, but the median spine on the posterior margin of the 6th somite measures two-thirds the length of the lateral. The small tubercles at the base of the 1st tooth of the rostrum and on the middle of the carapace are well-developed.

General distribution: Ternate (DE MAN).

Superfamily PSALIDOPODOIDA.

Family Psalidopodidae.

Psalidopus W.-Mas.

This genus, the only one of the remarkable family of Psalidopodidae, is only represented by two species, which were discovered during the Season 1890—91 by H. M. Indian Marine Survey Steamer "Investigator" in the Andaman and Arabian Seas. *Psalidopus Huxleyi* W.-Mas. was until at present only known by a single adult female, taken at a depth of 490 fathoms in the Andaman Sea, $7^1/_2$ miles east of N. Cinque Island. Of the other form, *Psalidopus spiniventris* W.-Mas., both the male and the female are known: five specimens have been obtained in the Andaman Sea at 405 and 500 fathoms, in the Arabian Sea, in the neighbourhood of the Laccadives, at 636 and off Cape Comorin at 480 fathoms.

The Psalidopodidae are apparently very rare animals, a suggestion confirmed by the fact that the "Siboga" has only obtained one single individual.

1. *Psalidopus Huxleyi* W.-Mas. Pl. XVI, Fig. 47, 47*a*.

Psalidopus Huxleyi J. Wood-Mason, Ann. Mag. Nat. Hist., April 1892, p. 273, Pl. XIV, figs. 1, 2, 7.

Psalidopus Huxleyi A. Alcock, A descript. Catal. Indian Deep-Sea Crustacea, Calcutta 1901, p. 112.

Illustrations of the Zoology of the Investigator, Crustacea, Pl. LI, figs. 5, 5*a*—*b*.

Stat. 300. January 30, 1900. 10° 48′.6 S., 123° 23′.1 E. Off the south coast of Rotti. 918 m. Bottom fine grey mud. 1 adult female without eggs.

As far as I am aware, this is the second specimen of this species, which has been discovered; it is therefore a capture of great importance, though the discovery of the male should have been still more interesting. Our specimen very well agrees with the quoted descriptions and figures and shows about the same size. The carapace, indeed, from supra-orbital to posterior margin proves to be 28,5 mm. long, the rostrum 52 mm., but the abdomen is 72 or 73 mm. long from the middle of the anterior margin of first tergum to tip of telson, instead of 63 mm. in Wood-Mason's specimen. In the first description of 1892 both species are distinguished, besides by the thoracic and abdominal sterna being unarmed or not, by the existence in *Psalid.*

spiniventris of a conical tubercle between the last spine of the dorsal ridge and the posterior margin of the carapace: in the present female a small subacute tubercle occurs just in front of the posterior margin, while it is one millimeter distant from the last spine. In ALCOCK's description of 1901 this character has rightly no more been mentioned. The three posterior legs appear a little shorter than in that description. The 5th pair, indeed, nearly reach the tip of the antennal scale, but do not extend beyond it; the 4th pair reach only to the base of the terminal spine of the scale and the legs of the 3rd pair are hardly shorter.

The depth, 918 meter = 500 fathoms, at which this female was taken, is the same as that of the type specimen.

The colour of this specimen, preserved in alcohol, is yellow-whitish.

General distribution: Andaman Sea, $7^1/_2$ miles east of N. Cinque Island.

Superfamily CRANGONOIDA.

Family GNATHOPHYLLIDAE.

LIST OF ALL THE SPECIES OF GNATHOPHYLLIDAE, KNOWN AT PRESENT.

SPECIES	HABITAT	DEPTH IN FATHOMS
	Gnathophyllum Latr. 1829.	
americanum Guér. 1857.	Cuba	
	St. Thomas	
	Porto Rico	
	Gulf of Mexico	26 to 27
	Bermudas	
elegans (Risso) 1816.	Mediterranean	10—20
	Adriatic	
elegans (Risso) var. *brevirostris* Gourret 1887	Gulf of Marseille	
fasciolatum Stimps. 1860.	Port Jackson	6
	Port Stephens	
	Hawaiian Islands	Surface
	Tahiti	
	Amboina	Reef
	Ternate	
	Near the North-point of Saleyer-island	Reef
	East coast of Borneo	Muaras-reef
	Mauritius	
	Minikoi	
	Seychelles	
	Djibouti, Muschah Islands	
panamense Faxon 1893	Panama	On the reef, at low tide
tridens Nobili 1906	Rikitea	Reef
sp. Hay 1917 [1])	North Carolina	

1) This species has been described in: Proc. Biol. Soc. Washington. Vol. 30. 1917, p. 71—74, this periodical, however, was not at my disposal.

SPECIES	HABITAT	DEPTH IN FATHOMS
Phyllognathia Borr. 1915.		
ceratophthalma (Balss) 1913	Satsuma, Japan	
	S. Nilandu Atoll, in the Maldives	
Hymenocera Latr. 1829.		
elegans Heller 1861	Tor, Red Sea	Between Corals
	Djibouti	Reef, at 2 fathoms
	Matemmo Island, Mozambique	
	Seychelles	
	Mauritius	
	West coast of Binongka	Reef
	Amboina	
	Ternate	
Latreillii Guér..	Seychelles	
picta Dana 1852	Raraka, Paumotu Islands.	Coral reefs

Gnathophyllum Latr.

The genus *Gnathophyllum* Latr. contains five or six species and one variety, all of small size and of a charming and elegant colouration. *Gnathophyllum elegans* (Risso) is found in the Mediterranean and the Adriatic, a variety *brevirostris* Gourret [1]) occurs in the Bay of Marseilles. A species from the coast of North Carolina has recently been described by W. P. Hay (vide p. 187, Note). Still a second form occurs on the East coast of America, namely in the Gulf of Mexico, at the Bermudas and on the shores of Cuba and Porto Rico, *Gnath. americanum* Guér., with which an indopacific species, *Gnath. fasciolatum* Stimps., is considered by Miss Rathbun and Nobili to be identical. This *Gnath. fasciolatum* Stimps. is known from Port Jackson, from the Hawaiian Islands and from the Indian Archipelago, having been observed at Ternate, Amboina, near the North point of Saleyer-island and on the Muaras-reef, east coast of Borneo; it is known from the Seychelles, Minikoi and Djibouti and is moreover recorded by Ortmann from Tahiti under the name of *Gnath. pallidum* and by Richters from Mauritius under the name of *Gnath. zebra*. *Gnath. tridens* Nobili, which in the pattern of its colouration much resembles *Gnath. fasciolatum*, is still only known from the reefs of Rikitea, on the isle of Mangareva, one of the Paumotu Islands. The last species, finally, *Gnath. panamense* Faxon, was taken on the reef at Panama.

Gnath. elegans (Risso) occurs at a depth of 10—20 fathoms, while *Gnath. americanum* Guér. is found in the Gulf of Mexico at 26 to 27 fathoms; *Gnath. fasciolatum* Stimps. was taken in water of 6 fathoms in Port Jackson and off the Hawaiian Islands at the surface, *Gnath. tridens* and *panamense*, finally, on the reef at low tide.

1) In P. Gourret's work "Révision des Crustacés Podophthalmes du Golfe de Marseille, Marseille 1888" this variety is described at p. 120 under the name of *brevirostris*, but at p. 33 under the name of *rectirostris*! Gourret's "Note à l'Institut 1887" was not at my disposal.

1. *Gnathophyllum fasciolatum* Stimps. Pl. XVI, Fig. 48—48*c*.

Gnathophyllum fasciolatum W. Stimpson, Proc. Acad. Nat. Scienc. Philadelphia, 1860, p. 28.
Gnathophyllum fasciolatum J. G. de Man, Archiv f. Naturg. Bd. 53, 1888, p. 496 and in: Abhandl. Senckenb. Naturf. Gesells. Bd. XXV, 1902, p. 762.
Gnathophyllum fasciolatum M. J. Rathbun, in: U. S. Fish Commission Bull. for 1903, Part III, Wash. 1906, p. 926, fig. 74.

Stat. 91. June 22. Muaras-reef, inner side: east coast of Borneo. 1 ova-bearing female.
Stat. 181. Sept. 5/11. Ambon-anchorage. Reef. 2 adult males and 2 adult, ova-bearing females.
Stat. 213. Sept. 26—Oct. 26. Pulu Pasi Tanette, near the North point of Saleyer-island. Reef. 1 female without eggs.

According to Stimpson this species attains a length of about 20 mm., the largest of the present specimens, an ova-bearing female from Amboina, measures nearly 15 mm. from tip of rostrum to tip of telson. Like in many other Caridea the development of ova takes place at different ages, the egg-bearing female from Stat. 91, indeed, is only 8,5 mm. long!

In all the specimens the rostrum, a trifle shorter than the basal joint of the antennular peduncle, is armed above with five teeth, not including the acute tip, and below with one minute, almost rudimentary denticle, which is considerably smaller than the teeth on the upper margin; in the largest female from Stat. 181 this denticle is as far distant from the apex as the anterior tooth of the upper margin, in one male just half as far distant from the apex as this tooth, while in the rest the anterior tooth is one and a half as far distant from the apex as the small denticle. As was already pointed out by Richters in his description of the identical *Gnath. zebra* (in: Beiträge zur Meeresfauna der Insel Mauritius und der Seychellen, 1880, p. 162, Taf. XVII, fig. 22), the 1st or posterior tooth of the upper border is placed just in front of the orbital margin, a character also observed in *Gnath. tridens* Nobili from the reefs of Rikitea, but not in *Gnath. elegans* (Risso) nor in *Gnath. panamense* Faxon. The rostrum arises gradually with a rounded and obtuse carina in front of the middle of the carapace, and this carina becomes gradually more compressed anteriorly; viewed at from above the rostrum looks like an equilateral triangle, flattened at either side of the median carina, the lateral margins of which are rather sharp. Antennal spine well-developed. Antero-inferior angle of carapace prominent, projecting a little beyond the 2nd joint of the antennal peduncle.

Sixth somite of abdomen little longer than 5th. The telson (Fig. 48, 48*a*) measures in the adult female two-fifths the length of the carapace, rostrum included. In full-grown specimens it is twice as long as wide proximally, but in the ova-bearing female from Stat. 91, which is only 8,5 mm. long, it appears a little less than half as broad at base as long; width of tip almost half as large as that of the base. The lateral spinules of the telson are rather large, in adult individuals measuring 0,24—0,28 mm.; the anterior pair is usually placed on the middle of the telson, the posterior at the posterior fourth, but in the male (N° 2 of the Table) the anterior pair is implanted a little more backward, so that the distance between the two pairs is here smaller; of the two pairs of terminal spines the longer measure $^3/_5$ the length of the telson, the shorter $^2/_3$ of the longer.

Eyepeduncles robust, a little longer than the rostrum, with a black coloured tubercle

on the middle of the cornea and with a small, black ocellus on the upper side of the stalk, contiguous to the cornea.

Basal joint of antennular peduncle considerably dilated laterally, the dilated part truncate anteriorly with a forwardly directed spine at the outer angle, stylocerite flattened with the acute tip curved inward and just reaching beyond the boundary between the 1st and 2nd article; 2nd article slightly broader than long, 3rd a little smaller than 2nd.

Second joint of antennal peduncle unarmed, the peduncle as long as the basal joint of the peduncle of the upper antennae; scale a little longer than the latter, with the outer margin straight and the terminal spine a little shorter than the rounded tip of the lamella.

Antero-external angle of the antepenultimate joint (Fig. 48*b*) of the external maxillipeds rounded; penultimate joint trapeziform, the inner and outer margins parallel, the inner shorter than the outer; ultimate joint elliptical, twice as long as broad and distinctly longer than the penultimate.

Peraeopods of the 1st pair equal, reaching by the chela beyond the antennal scale, carpus nearly as long as the merus, chela a little shorter than the carpus, fingers a little shorter than the palm. Peraeopods of the 2nd pair (Fig. 48*c*, 48*d*) also equal, in the male larger and stronger than in the female, and projecting by the chela beyond the antennal scale. Merus of 2nd pair, in the male, nearly half as long as the carapace, rostrum included, 4-times as long as broad; carpus a trifle shorter than merus, 3-times as long as thick distally; chela $2^1/_2$-times as long as the carpus and a little longer than the carapace, rostrum included, palm three-fourths the length of the chela, 4-times as long as broad and slightly becoming broader from the carpal articulation to that of the dactylus; immobile finger with 2 teeth on the proximal half of the cutting-edge, while the two teeth of the dactylus are placed close together on the middle of the finger, the teeth of the immobile finger are a little larger than those of the dactylus and on each finger the proximal tooth is distinctly larger than the following. In the adult female the merus of the 2nd legs measures about two-fifths the length of the carapace, rostrum included, and is, like in the male, 4-times as long as wide; carpus a trifle shorter than the merus and nearly 3-times as long as thick distally; chela a little shorter than the carapace, rostrum included, $2^1/_2$-times as long as the carpus, palm 4-times as long as broad and measuring two-thirds the length of the chela, fingers half as long as the palm, each with two teeth, placed like in the male, but much smaller, rudimentary. Dactyli of the three posterior legs (Fig. 48*e*) with a small, acute, accessory claw.

Largest diameter of the ova, both in the full-grown (Stat. 181) and in the small-sized (Stat. 91) female, long 0,52 mm.

The two males bear a parasite on the under side of the abdomen.

Length of carapace, rostrum included, of the male 4,5 mm., of the full-grown female 4,85 mm.

Table of Measurements in millimeters.

	1	2	3	4
Length of telson	1,7	1,7	1,92	1,2
Width of telson at base	0,85	0,85	0,95	0,54
Width of tip of telson	0,38	0,4	0,42	0,24

		1	2	3	4
Distance between the base and the anterior pair of lateral spinules		0,84	0,96	0,95	0,62
Distance between the base and the posterior pair of lateral spinules		1,2	1,32	1,4	0,92
Length of the merus	of the leg of the 2nd pair	.	2,12	2	
Width of the merus		.	0,54	0,5	
Length of the carpus		.	2	1,8	
Width of the carpus at distal extremity		.	0,7	0,64	
Length of the chela		.	5,1	4,44	
Length of the palm		.	3,7	3	
Width of the palm in the middle		.	0,95	0,77	
Length of the fingers		.	1,4	1,44	

N° 1—3 Stat. 181, N° 4 female from Stat. 91.

General distribution: Port Jackson (Stimpson); Hawaiian Islands (Rathbun); Tahiti (Ortmann, as *Gnath. pallidum*); Amboina (de Man); Ternate (de Man); Mauritius (Richters, as *Gnath. zebra*); Minikoi (Borradaile); Seychelles (Borradaile); Djibouti, Muschah Islands (Nobili, as *Gnath. americanum* Guér.).

According to Miss Rathbun *Gnath. fasciolatum* Stimps. should be identical with *Gnath. americanum* Guér. and in this case occur in the Gulf of Mexico, on the shores of Cuba and Porto Rico.

Hymenocera Latr.

In the "Proceedings of the Academy of Natural Sciences of Philadelphia" the late Professor B. Sharp has published in 1893 a Catalogue of the Crustacea in the Museum of that Academy. This Catalogue mentions the name of *Hymenocera Latreillii* Guér., Indian Region, Seychelles, but I did not succeed in establishing in which work and at what time this species was described by Guérin. Besides this *Hym. Latreillii* still two other species of the genus are known as occurring in the Indopacific, firstly *Hym. picta* Dana from the coral reefs of Raraka, one of the Paumotu Islands, and furthermore *Hym. elegans* Heller, which is found in the Red Sea, in Coetivy, Seychelles, on the coast of Mozambique, off Mauritius and in the Indian Archipelago, a form which perhaps shall prove to be identical with the species described by Guérin.

The species of *Hymenocera* are found between corals on coral reefs.

1. *Hymenocera elegans* Heller. Pl. XVI, Fig. 49.

Hymenocera elegans C. Heller, in: Sitz. Ber. Kais. Akad. Wiss. Wien, XLIV 1861, p. 264, Taf. III, fig. 9—14.
Hymenocera elegans F. Hilgendorf, in: Monatsber. Kön. Akad. Wiss. Berlin, Nov. 1878, p. 828.
Hymenocera elegans J. G. de Man, in: Abhandl. Senckenb. Naturf. Gesells. Frankfurt a/Main, XXV, 1902, p. 822, Taf. XXV, fig. 52.
Hymenocera elegans G. Nobili, in: Annal. Scienc. Natur. 9e Série, Zool. T. IV, 1906, p. 69.

Stat. 220. Nov. 1/3. Anchorage off Pasir Pandjang, west coast of Binongka. Reef. 1 female without eggs.

This female is 26 mm. long from tip of rostrum to tip of telson and proves thus to be half-grown, for of this species the male and the female attain respectively a length of 40 mm. and 44 mm. (J. G. DE MAN, G. NOBILI, locis citatis); it fully agrees with the younger specimens from Ternate, described by me in 1902. The rostrum that reaches to beyond the middle of 2nd antennular article, is $\frac{5}{7}$-dentate, two teeth stand on the carapace, the third above the orbital margin with the tip situated a little in front of it; tooth of the lower border placed just below the anterior tooth of the upper. The telson (Fig. 49), 3 mm. long, measures about $^1/_9$ the entire length, the width, anteriorly, 1,8 mm., is a little more than half the length and in proportion to the width, 0,64 mm., of the tip like 1 : 0,36; the dorso-lateral spinules are rather large, the anterior 0,6 mm. long, one-fifth the length of the telson, the posterior 0,5 mm. long; the telson terminates in a sharp spine, on either side of which two spines are implanted, of which the longer inner one measures one-third the entire length of the telson, the outer one two-fifths the inner. Uropods considerably longer than telson.

According to NOBILI the pleopods of the adult, ova-bearing female are "élargies, foliacées, membraneuses, amples, analogues (mais de forme ovalaire et moins larges) aux expansions membraneuses des antennules et des maxillipèdes". In the present female they have the usual *lanceolate* shape; the exopodite of the 2nd pleopod is 3 mm. long, 5-times as long as broad, appearing rather narrow, the inner branch, which is hardly shorter, 6-times as long as broad; stylamblys with well-developed cincinnuli at the tip, 0,8 mm. long, two-sevenths the length of the inner branch, and implanted, as usual, at the proximal third of the outer margin.

This species will perhaps prove to be identical with *Hymenocera Latreillii* Guér. of the Seychelles, mentioned at p. 191.

General distribution: Tor, Red Sea (HELLER); Djibouti (NOBILI); Matemmo Island, Mozambique (HILGENDORF); Seychelles (BORRADAILE); Mauritius (ORTMANN); Amboina (ORTMANN); Ternate (DE MAN).

Family PROCESSIDAE.

Nikoides Paulson.

The genus *Nikoides* Paulson, distinguished from *Processa* Leach by the 1st pair of peraeopods being furnished with a well-developed exopodite, comprises four species. One of them, *Nik. pontica* Sowinsky, is found in the Black Sea. *Nik. Danae* Paulson, the first described species, occurs in the Red Sea and is known from Djibouti, Perim and the Kamaran Islands. A third closely related form, *Nik. maldivensis* Borr., has been recorded from the Maldives and the Amirante Islands. The fourth species, finally, *Nik. Sibogae*, was captured by the "Siboga" off Makassar, at the east coast of the Aru-islands and between Nusa Besi and the N.E.-point of Timor.

The species of *Nikoides* occur in shallow water. *Nik. Danae* was found at Djibouti at a depth of 11 fathoms, *Nik. Sibogae* at 50, at 31, between 15 and 30 and up to 17 fathoms.

LIST OF THE SPECIES OF NIKOIDES PAULSON, KNOWN AT PRESENT.

SPECIES	HABITAT	DEPTH IN FATHOMS
Danae Paulson 1875 . .	Red Sea	
	Djibouti	11
	Perim	
	Kamaran Islands	
maldivensis Borr. 1915.	Maldive Islands	
	Amirante Islands	
pontica Sowinsky 1882.	Black Sea	
Sibogae de Man 1918 .	Makassar	Up to 17
	2,3 miles N. 63° W. from the North-point of Nuhu Jaan, Kei-islands	50
	East coast of Aru-islands	31
	Between Nusa Besi and the N.E.-point of Timor	15—30

1. *Nikoides Sibogae* de Man. Pl. XVI, Fig. 50—50*f*.

Nikoides Sibogae J. G. de Man, in: Zoologische Mededeelingen, uitgegeven vanwege 's Rijks Museum van Natuurlijke Historie te Leiden. 1918, Deel IV, Afl. 3, p. 160.

Stat. 71. May 10—June 7. Makassar and Surroundings. Up to 32 m. Bottom mud. Sand with mud. 1 young specimen.

Stat. 260. Dec. 16 and 18. 5° 36'.5 S., 132° 55'.2 E. 90 m. 2,3 miles N. 63° W. from the North point of Nuhu Jaan, Kei-islands. Bottom sand, coral and shells. 1 full-grown, ova-bearing female, wrapped in a felt-like tube.

Stat. 274. Dec. 26. 5° 28'.2 S., 134° 53'.9 E. East coast of Aru-islands. 57 m. 2 females without eggs.

Stat. 282. January 15/17, 1900. 8° 25'.2 S., 127° 18'.4 E. Anchorage between Nusa Besi and the N.E.-point of Timor. 27—54 m. Bottom sand, coral and Lithothamnion. 1 young specimen.

This new species is closely related to *Nikoides Danae* Paulson, of which NOBILI has given a detailed description in 1906 (in: Annal. Scienc. Nat., 9e Série, Zool., T. IV, p. 79, Pl. 5, fig. 1—1*f*): it differs evidently by the different form of the rostrum and of the simple leg of the 1st pair [1]).

The largest of the 5 specimens, which is considered as the type, is the ova-bearing female from Stat. 260, that measures 42 mm. from tip of rostrum to tip of telson. The carapace, rostrum included, is 13,3 mm. long and without the rostrum 10,2 mm.; it is 5,5 mm. high, appears therefore nearly twice as long as high and half as long as the abdomen. The slender rostrum, which in the younger female from Stat. 274 appears as long, but in the other specimens (Fig. 50*b*, 50*c*) a little shorter than the eyes and which in the ova-bearing female measures about one-third the rest of the carapace, projects horizontally forward in a line with the straight upper border of the carapace, though the tip appears in the largest specimens slightly curved downward; the rostrum is compressed, the lower border, in a lateral view slightly convex

1) The description of *Nikoides pontica* Sowinsky in the "Mémoires Soc. Sciences Kieff, 1882", could not be consulted, because these memoirs are not found in any library of Holland, as far as I am aware.

proximally, slightly concave in its anterior half, shows therefore its greatest height near the base, a little less than one-sixth the length, and gradually becomes lower anteriorly. Both the upper and the lower border of the rostrum end in a small acute tooth; that of the upper is half as long as the tooth into which terminates the lower, reaches not so far forward and a tuft of setae are implanted in the notch between the two teeth. According to the figures in PAULSON's work (Recherches sur les Crustacés de la Mer Rouge, Kieff, 1875, Pl. XIV, fig. 5) and in that of NOBILI (l. c. Pl. 5, fig. 1) the rostrum of *Nikoides Danae* shows a different form, the lower margin appearing slightly concave along its whole length and the apical teeth being comparatively larger.

Outer orbital angle rounded or obtuse, antennal spine small, acute, antero-inferior angle of carapace rounded. Carapace smooth, without furrows. The abdomen, which, without the telson, appears nearly 4-times as long as the 3rd somite is high, is also smooth and closely resembles that of *Proc. canaliculata* Leach, four specimens of which from the Gulf of Naples are lying before me. Like in this species the straight lower margin of the pleura of the 5th somite terminates posteriorly in a minute acute tooth, while there are two spines at either side of the 6th, one on either side of the posterior margin, the other at the posterior extremity of the lower. The telson (Fig. 50*d*), which in the largest specimen appears half as long as the carapace, rostrum included, and nearly one-third the rest of the abdomen, tapers rather considerably backward, more than that of *Proc. canaliculata*; the greatest width, anteriorly, is a little more than one-fourth the length and 3,7-times as broad as that of the tip; the telson is distinctly grooved, but the groove fades away at the anterior sixth and it appears setose along its whole length. The dorso-lateral spinules are 0,32—0,34 mm. long; the distance between the anterior pair and the posterior margin of 6th somite measures in the egg-laden female from Stat. 260 a little more than one-third the whole length, in the larger female from Stat. 274 slightly more than two-fifths, but in the younger specimens one-third or one-fourth, while the distance of the posterior pair from the 6th somite measures in the female from Stat. 260 a little more than half, in the younger specimens two-thirds the length of the telson. On each side the tip (Fig. 50*c*) of the telson bears 2 spines, of which the inner is 3-times as long as the outer; between the two inner spines one observes at either side 4 setae, the lower of which is feathered and as long as these spines, while the three others, implanted on the upper side of the rounded apex, are shorter and simple. The specimen from Stat. 71 shows, as regards the tip of the telson (Fig. 50*i*), a remarkable variety: between the two inner spines occur three other ones of subequal length, about half as long as the former, and feathered.

Eyes large, contiguous, almost as broad as long.

Antennular peduncle slender, distance from the orbital margin to the far end of basal article one-third longer than the 2nd and 3rd joint combined; 1st joint deeply excavate, 2nd joint in the female from Stat. 260 3,4-times as long as thick and twice as long as 3rd; stylocerite very short, lamellate, concave above, with sharp rounded anterior margin.

Second joint of antennal peduncle unarmed, peduncle reaching to the distal third or fourth of the 2nd joint of that of the upper antennae; scaphocerite a trifle longer than the antennular peduncle, nearly half as long as the carapace, rostrum included — 7,2 mm. long in the female

from Stat. 260 — 6-times as long as broad, terminal spine (Fig. 50*f*) of the outer margin not reaching beyond the obtuse tip of the blade and curved toward it. In the specimen from Stat. 71 the terminal spine (Fig. 50*f*) projects, however, straight forward beyond the tip of the lamella.

The external maxillipeds project by the ultimate and almost the whole penultimate joint beyond the antennal scale; the ultimate joint is distinctly shorter than the penultimate and both together measure a little less than two-thirds of the antepenultimate; the exopodite extends about to the middle of the latter.

The chelate leg (Fig. 50*g*) of 1st pair agrees with PAULSON's figure 5*b* of *Nikoides Danae*: in the ova-bearing female the merus of this leg that extends by the fingers beyond the antennal scale, is 7-times as long as broad, the carpus, $2^1/_2$-times as long as thick, measures a little more than one-third of the merus, the palm, finally, almost one and a half as long as the fingers, is slightly shorter than the carpus. According to NOBILI's description, however, the merus should be, in PAULSON's species, twice as long as the carpus.

The left simple peraeopod (Fig. 50*h*) has, unfortunately, not been figured by PAULSON and his russian description is unintelligible for me: NOBILI's figure 1*f*, however, of this leg differs much from our species and therefore the latter is described as new. The merus, indeed, appears in the largest specimen from Stat. 260 eight-, but in NOBILI's figure only five-times as long as broad in the middle; the carpus, which in this figure appears $2^1/_3$-times as long as thick distally and more than half as long as the merus, shows in the female from Stat. 260 a much more slender form, like the merus, being 4-times as long as thick distally and measures not yet two-fifths the length of the preceding joint; the propodus, finally, in NOBILI's figure almost as long as the merus, appears in the specimen from Stat. 260 not yet half as long as the latter. In the younger female from Stat. 274 and in that from Stat. 71 the simple leg is wanting, in the specimen from Stat. 282, which is very young, only 10 mm. long, the propodus appears slightly more than half as long as the merus. In both peraeopods of the 1st pair the exopodite reaches almost to the middle of the merus.

In the ova-bearing female only one leg of the 2nd pair is preserved. The ischium is 6,6 mm. long and bears along the proximal third a dilatation, which is about half as broad as long. Merus 5,3 mm. long, slightly shorter than the ischium, and obscurely subdivided into 9 joints, of which the 1st or proximal is the longest, measuring one-fourth the length of the joint; the following become gradually shorter, but the last joint is as long as the two preceding together. Carpus 10,5 mm. long, twice as long as the merus and subdivided into 27 annulations, that are short and subequal, except the 1st and 2nd proximal ones that are longer, while the last is as long as the two preceding together. Chela 1,75 mm. long, one-sixth of the carpus, fingers distinctly shorter than the palm which is twice as long as broad. By analogy with the female from Stat. 71 this leg is certainly the shorter one. In the two specimens from Stat. 274 the 2nd legs are lost. In the female, long 18 mm. from Stat. 71, the left shorter leg reaches by the chela and half the carpus beyond the antennal scale, the longer right leg by the chela, the carpus and one-fifth of the merus. Of the shorter leg the merus is 2,1 mm. long and subdivided into 7 joints, of which the proximal or 1st is the longest, twice as long as the 2nd, while the following are subequal; the carpus is 4 mm. long, nearly twice as long as the merus,

with 22 segments of which the last is as long as the two preceding ones; chela 0,75 long, palm 0,42 mm., fingers 0,33 mm. Of the longer leg the merus is 3,3 mm. long with 23 segments, of which the 1st is $2^1/_2$-times as long as the 2nd; carpus long 6,2 mm., almost twice as long as the merus and one and a half as long as the carpus of the other leg, with about 50 segments, of which the last is as long as the two preceding together; chela long 0,52 mm., palm long 0,28 mm., fingers 0,24 mm.

The peraeopods of the 3rd pair reach in the largest specimen by the dactylus, the propodus and four-fifths of the carpus beyond the antennal scale, those of the 4th by the dactylus, the propodus and the whole carpus, those of the last pair, like the 3rd, by the dactylus, the propodus and four-fifths of the carpus, while these legs of the 5th pair project by the dactylus and half the propodus beyond the legs of the 3rd pair. Like in *Nikoides Danae* 2 spines exist on the ischium of the 3rd and 4th pair, one near the proximal, one near the distal end; the merus of the 3rd pair is armed with 4, that of the 4th with 5 spines; the last pair of legs are quite unarmed. In the largest specimens the propodus of the 5th pair is still a little shorter than the carpus, but in the female from Stat. 71 the propodus is one-third longer, like in *Nikoides Danae*, according to Nobili. The dactyli measure in the largest specimen one-third of the propodi, in the larger female from Stat. 274 they are a little longer, in the female from Stat. 71 a little shorter than one-third of the preceding joint. In the other specimens the three last legs are wanting or incomplete.

In the ova-bearing female the inner branch of the 2nd pleopod is 6-times as long as broad, has therefore a rather narrow shape and bears, at the proximal third, a well-developed stylamblys that measures one-fifth the length of the branch; the stylamblys is furnished at the tip with about 20 cincinnuli of the usual form and is about 9-times as long as thick; the outer branch has the same shape as the inner and is but a trifle longer.

Eggs small, numerous, 0,46—0,5 mm. long.

The larger female from Stat. 274, that has been figured, is 25,2 mm. long, from tip of rostrum to tip of telson, the carapace, rostrum included, 8,1 mm. long and 3,5 mm. high, abdomen 17,1 mm. long.

The ova-bearing female from Stat. 260 was wrapped in a felt-like tube, similarly as *Alpheus frontalis* H. M.-Edw.; examined under the microscope, the tube was apparently formed by small particles, Foraminifers, microscopical shells etc.

Table of Measurements in millimeters.

	1	2	3	4	5
Length of the telson	2,8	6,5	3,64	2,7	1,9
Width of the telson proximally	0,8	1,7	1,08	0,78	0,5
Width of the tip of the telson	0,28	0,46	0,32	0,26	0,17
Distance of the anterior pair of spinules from the posterior border of 6th somite	0,72	2,3	1,56	0,9	0,58
Distance of the posterior pair of spinules from the posterior border of 6th somite	1,7	3,76	2,56	1,7	1,16
Length of the merus of the chelate leg	2,4	6,7	4,1	2,9	
Width „ „ „ „ „ „ „	0,48	1	0,68	0,53	
Length of the carpus „ „ „ „	0,84	2,5	1,5	1,05	

SPECIES	1	2	3	4	5
Width of the distal end of this carpus	0,42	0,92	0,6	0,43	
Length of the chela	1,6	3,6	2,4	1,76	
Length of the palm.	1	2,1	1,5	1,04	
Length of the fingers	0,6	1,5	0,9	0,72	
Length of the merus of the simple leg.		7,4	4,4		1,8
Width „ „ „ „ „ „ „		0,92	0,52		0,275
Length of the carpus „ „ „ „		2,7	1,7		0,76
Width of the distal end of this carpus		0,7	0,38		0,22
Length of the propodus of the simple leg. . . .		3	2		1,38
Width of the propodus „ „ „ „		0,64	0,37		1,06
Length of the dactylus „ „ „ „		1	0,56		0,32
Length of the merus of third leg	2,16	7,1	4,2		
Length of the carpus „ „ „	2,7	8,4	5		
Length of the propodus „ „ „	1,6	3,5	2,24		
Length of the dactylus „ „ „	0,45	1,2	0,82		
Length of the merus of fourth leg	2,5	9,4	5,7		
Length of the carpus „ „ „	3	11,8	7,5		
Length of the propodus „ „ „	2,16	5,9			
Length of the dactylus „ „ „	0,6	1,8			
Length of the merus of fifth leg	2	9,3	5,4		
Length of the carpus „ „ „	1,5	8,5	4,96		
Length of the propodus „ „ „	2	7,3	4,24		
Length of the dactylus „ „ „	0,58	2,35	1,7		

N° 1, Stat. 71; N° 2, Stat. 260; N° 3 and 4, Stat. 274; N° 5, Stat. 282.

Processa Leach.

Thirteen species of this genus have hitherto been described, but some must, no doubt, be considered as invalid or as synonyms. *Processa Couchii* Bell from off the Cornwall coast and from off Great Yarmouth was, as has been several times suggested, probably founded on an abnormal specimen of the common *Proc. canaliculata* Leach: both the type and the only other specimen known are, unfortunately, lost. *Proc. sinuolata* (Risso) from Nice has not been found back since its first description in 1816: a specimen from Nice, that once belonged to the collection of Dr. Leach, exists, however, in the British Museum, according to Gray's "List of the specimens of Crustacea in the collection of the British Museum, London 1847" and it appears therefore desirable that a new detailed description of this rare animal should be published. A third species, *Proc. mediterranea*, from Nice was described in 1915 by B. Parisi (in: Monitore Zoolog. Italiano, Anno XXVI, N° 3, p. 65), but in the reprint which I had the honour to receive from him, the author wrote in 1918 with his own hand "non è nuova, ma è la *Processa canaliculata* Leach (= *N. edulis*)". *Proc. macrognatha* (Stimps.) from Hong Kong, only known by Stimpson's short diagnosis, is perhaps identical with the common european species, which is also recorded from Nagasaki and other japanese localities; it should differ from it by the stouter shape of the body and the shorter rostrum, but just in these characters *Proc. canaliculata* is known to vary.

Proc. canaliculata Leach, the type species of the genus, shows an almost cosmopolitan

distribution. This species, indeed, occurs in the eastern Atlantic from the [illegible] chela [illegible] to Cape Town and East London, in the Mediterranean, the Adriatic and the [illegible] in the western Atlantic from off North Carolina and the Bermudas to the Gulf of Mexico, Porto Rico and Trinidad; it was recorded from Ceylon and Japan and is distributed on the west coast of America from San Diego, California, to Panama Bay. Still another species is known from the Gulf of Gascony, viz.: *Proc. platyura* (Fischer), which, however, as far as I am aware, has not been found elsewhere.

The other species are confined to the Indopacific. In the Red Sea *Proc. aequimana* (Paulson) and *Proc. Coutierei* Nobili are found, in the Gulf of Martaban occurs *Proc. processa* (Bate), and *Proc. macrognatha* (Stimps.) from Hong Kong was recorded by the author of this Report from the Mergui Archipelago; besides *Proc. canaliculata* still two other species, *Proc. japonica* (de Haan) and *Proc. processa* (Bate), are known from Japan, the Hawaiian Islands are inhabited by *Proc. hawaiensis* (Dana) and *Proc. processa* (Bate), while four or perhaps a few more species are distributed throughout the Indian Archipelago, viz.: *Proc. processa* (Bate), *Proc. japonica* (de Haan), *Proc. australiensis* Baker and the forms that will be described under the name of *Processa* sp. Two species, finally, are known from the South Australian coast, *Proc. australiensis* Baker and *Proc. gracilis* Baker.

Concerning the vertical range of *Proc. canaliculata* Leach Mr. Stanley Kemp in his valuable work "The Decapoda Natantia of the Coasts of Ireland" remarks that it is found off the Irish Coast between 3 and 199 fathoms, but that it is apparently of rare occurrence outside the 100 fathom line. Off the american coasts it ranges from shallow water to 111 fathoms (Rathbun), while in the Mediterranean it has been recorded from depths of 216 fathoms (Senna) and 326 fathoms (Adensamer). The indopacific species occur in shallow water, as far as their vertical range is known; the greatest recorded depth is 71 fathoms, at which *Proc. processa* was taken in Japan; one species was obtained on the N. W. coast of Waigeu-island at 45 and another off the Hawaiian Islands between 21 and 43 fathoms, but often species were taken in more shallow water and on the reef.

LIST OF THE SPECIES OF PROCESSA Leach, KNOWN AT PRESENT.

SPECIES	HABITAT	DEPTH IN FATHOMS
acquimana (Paulson) 1875 . .	Red Sea	
australiensis Baker 1907 . . .	South australian coast	
	East coast of Aru-islands	7
	Kei-islands	12
	Anchorage off North-Ubian	9—12
	Sulu-archipelago	7—8
	Pulu Kaniungan Ketjil	Reef
	Makassar	Up to 17
	South of Saleyer	4
	Paternoster Islands	6, up to 20
	Batjulmati (Java).	Reef

SPECIES	HABITAT	DEPTH IN FATHOMS
canaliculata Leach 1815 . . .	From the south coast of Norway to the Mediterranean and Adriatic, including the Black Sea	In the Mediterranean at depths of 216 and 326
	Off Madeira	15
	Canary Islands	
	Cape Verde Islands	
	Nyanga-river, French Congo	8
	Musserra, Angola	5
	South Africa between Cape Town and East London	10—40
	Ceylon	
	Japan	
	San Diego, California	
	Off Abreojos Point, Lower California	48
	Gulf of California	29—71
	Panama Bay	51 1/2
	From off North Carolina and the Bermudas to the Gulf of Mexico, Porto Rico and Trinidad	
Couchii (Bell) 1853	Off the Cornwall coast	
	Great Yarmouth	
Coutierei Nobili 1904.	Djibouti	
gracilis Baker 1907	South australian coast	
hawaiensis (Dana) 1852. . . .	Hawaiian Islands	
japonica (de Haan) 1849 . . .	Japan (Bay of Tokio, Kadsiyama, Nagasaki)	
	Makassar	Up to 17
	Between Misool and New Guinea	17
	Saleh-bay	Up to 20
macrognatha (Stimps.) 1860 .	Hong Kong	8
	Mergui Archipelago	
platyura (Fischer) 1872. . . .	Cap Breton (Bay of Biscay)	28
processa (Bate) 1888.	Amboina	15
	Singapore	
	Gulf of Martaban	
	Hawaiian Islands	Reef. 21—43
	Dzushi, Japan	71
sinuolata (Risso) 1816.	Nice	
sp. Stebbing 1918.	Off Vetch's pier, Durban	From the sponge *Cerao chalinus.*
sp. de Man 1918	Anchorage off Djangkar (Java)	5
	Sulu-archipelago	8
	Sulu-island	7
	N. W. coast of Waigeu-island	45
	East coast of Sula Besi	12
	West coast of Great-Kei-island	15

1. *Processa australiensis* Baker. Pl. XVII, Fig. 51—51*m*.

Processa australiensis W. H. Baker, Notes on South Australian Decapod Crustacea, Part V, in: Trans. Royal Soc. South Australia, Vol. XXXI, 1907, p. 185, Pl. XXV, figs. 2—2*e*.
? *Nica macrognatha* W. Stimpson, Proc. Acad. Nat. Sciences Philadelphia, 1860, p. 26.

Stat. 7. March 11. 7° 55'.5 S., 114° 26' E. Reef of Batjulmati (Java). 1 male and 1 young female.
Stat. 40. April 2. Anchorage off Pulu Kawassang, Paternoster-islands. 12 m. Bottom coral-reef. 2 very young specimens, probably belonging to this species.
Stat. 66. May 7/8. Bank between islands of Bahuluwang and Tambolungan, south of Saleyer. 8 m. Bottom dead coral; Halimeda; Lithothamnion. 1 egg-laden female.
Stat. 71. May 10—June 7. Makassar. Up to 32 m. Bottom mud. Sand with mud. Coral. 2 ova-bearing females.
Stat. 89. June 21. Pulu Kaniungan Ketjil. Reef. 1 egg-bearing female.
Stat. 96. June 27. South-east side of Pearl-bank. Sulu-archipelago. 15 m. Lithothamnion-bottom. 1 egg-bearing female.
Stat. 99. June 28/29/30. 6° 7'.5 N., 120° 26' E. Anchorage of North-Ubian. 16—23 m. Lithothamnion-bottom. 2 young males.
Stat. 109. July 5/6. Anchorage off Pulu Tongkil, Sulu-archipelago. 13 m. Lithothamnion-bottom. 1 ova-bearing and 1 young female.
Stat. 258. Dec. 12/16. Tual-anchorage, Kei-islands. 22 m. Bottom Lithothamnion, sand and coral. 3 young specimens.
Stat. 273. Dec. 23/26. Anchorage off Pulu Jedan, East coast of Aru-islands. 13 m. Bottom sand and shells. 1 full-grown ova-bearing female.
Stat. 315. Febr. 17/18, 1900. Anchorage East of Sailus Besar, Paternoster-islands. Up to 36 m. Bottom coral and Lithothamnion. 1 egg-bearing female.
Unknown Station. 1 young specimen.

These specimens agree very well with BAKER's detailed description and belong certainly to this species, but it appears to me probable that STIMPSON's *Nica macrognatha* is identical, because his description or diagnosis is also applicable to these specimens: I prefer, however, to refer them to *Proc. australiensis*, on account of the detailed description of the latter.

The ova-bearing female from Stat. 273 is 15,5 mm. long from tip of rostrum to tip of telson, while BAKER indicates a length of 16 mm., omitting rostrum and telson: rostrum, carapace, abdomen without telson and telson are in this female respectively 0,9 mm., 3,75 mm., 8,6 mm. and 2,25 mm. long. The rostrum that reaches to the middle of the eyepeduncles and that is directed horizontally forward in a line with the straight upper border of the carapace, appears at its base nearly as broad as it is long and slightly depressed, but soon narrows to form an acuminate and compressed spine; of the rostrum that measures one-fourth the length of the rest of the carapace, both the upper and the lower margin end (Fig. 51 *b*) in a sharp spine, between which a few setae are implanted, while the lower spine reaches a little farther forward than the upper; in a lateral view the height of the rostrum proves to be about one-sixth the length and the lower margin appears in the middle slightly convex, at the base slightly concave. The carapace, which, without the rostrum, measures one-fourth the entire length, is slightly depressed, hardly higher than broad, the height (2,56 mm.) being in proportion to the width (2,4 mm.) like 1 : 0,94 and the carapace appears one and a half as long as high; carapace perfectly smooth, antennal spine acute but very small, antero-inferior angle of carapace rounded.

The pleura of the 1st abdominal somite are rounded anteriorly, not "somewhat acutely", as we read in BAKER's description. The telson (Fig. 51 *d*), grooved longitudinally, measures $^1/_7$ the entire length of the body and is 3-times as long as broad proximally, while the width at base is in proportion to that of the tip like 2,7 : 1; the anterior pair of dorso-lateral spinules that are 0,19 mm. long, $^1/_{12}$ the length of the telson, are implanted at one-fifth the length from the base, the posterior pair that show the same length, just behind the middle. The uropods are

both longer than the telson, the outer lobe of the peduncle is rounded, but the inner ends in a small acute spine; the outer margin of the external uropod, slightly convex anteriorly, slightly concave posteriorly, ends in a small spine; the diaeresis is armed with two triangular acute teeth of equal size one at the outer, one at the inner side, that are just as long as broad at their base, projecting forward, though not reaching to the middle of the terminal lobe of the uropod.

The terminal segment of the ocular peduncle is hardly longer than wide, the distinctly, though finely, faceted corneal surface occupies half the length of the segment, while the proximal half is slightly flattened; ocellus absent, but the dark blue pigment of the eye extends a little on the outer side of the peduncle.

First segment of antennular peduncle a little longer than the two following taken together, 2nd one and a half as long as thick and just as long as 3rd; stylocerite short, shorter than the eyes, obliquely truncate at the tip.

Second joint of antennal peduncle with a small subacute tubercle (no spine) on the lower side, peduncle and scaphocerite (Fig. 51*f*) agree with BAKER's description and figures. The external maxillipeds hardly extend beyond the thicker upper antennular flagellum, but the antepenultimate joint not yet, though almost, attains the distal extremity of the scaphocerite; in BAKER's figure 2, however, this joint reaches distinctly beyond the antennal scale, but in the ova-bearing female from Stat. 89 the scaphocerite appears also a little shorter than the antepenultimate joint; the two last joints are subequal in length and together a little shorter than the antepenultimate, the proportion being like 28 : 33.

Merus of the chelate leg (Fig. 51*g*) of the 1st pair 3-times as long as broad in the middle, almost 3-times as long as the carpus, which has a stout shape, the proportion between length and width being like 4 : 3; palm one-fifth longer than carpus, fingers as long as the palm. Merus of the left simple leg (Fig. 51*h*) of the 1st pair little longer than that of the chelate and 4-times as long as wide; length of the carpus one-third that of the merus, carpus of a less stout shape than in the chelate leg, the proportion between length and width being like 5 : 3; propodus twice as long as the carpus, $3^1/_2$-times as long as broad, dactylus one-third of propodus.

The right leg of the 2nd pair reaches by the chela and the two last joints of the carpus beyond the external maxillipeds, the left leg extends to the distal third of the ultimate joint. The suture on the ischium of the right leg, that BAKER describes, is situated a little behind the middle, the expansion on the proximal part is tipped with 4 recurved setae; the merus is 2,06 mm. long, a little longer than the ischium, the 5—7 annuli are hardly perceptible, the carpus, 3,6 mm., is one and three-fourth times as long as the merus (Fig. 51*i*) and divided into 19 or 20 joints, of which the 1st is $2^1/_2$-times as long as thick distally, those in the middle a little broader than long, the last a little longer than broad; the chela measures $^1/_3$ of the carpus, is a little more than twice as long as wide and the gaping fingers are slightly shorter than the palm. The expansion on the ischium of the slightly shorter left leg bears only 3 recurved setae and the suture lies also behind the middle; the merus is 1,7 mm. long, its segments are still more obscure than in the right leg; the carpus, 2,67 mm., is about one and a half as long as the merus (Fig. 51*j*) and divided into 12 segments that resemble those of the other leg; the

chela measures one-fifth of the carpus, is about 3-times as long as broad and the fingers hardly shorter than the palm.

The three posterior legs, of which the measurements are indicated in the Table, agree with BAKER's description.

Eggs small, larger diameter 0,45 mm.

The male from Stat. 7 is about 13 mm. long from tip of rostrum to tip of telson. The rostrum reaches to the middle of the cornea of the eyes and the antennal spine is well-developed, larger than in the female from Stat. 273. Of the 2nd pleopod (Fig. 51*k*, 51*l*, 51*m*) the two branches are narrow, the endopodite $^1/_7$ shorter than the other; stylamblys with well-developed cincinnuli, implanted at the proximal third of the inner branch and measuring one-fourth its length, appendix masculina twice as long as the stylamblys with 4 pectinated setae at the tip.

The egg-bearing female from Stat. 66 is only 10,5 mm. long and shows some differences from the female collected at Stat. 273, but it is difficult to say whether they are of more than varietal importance. The distal styliform part of the rostrum is absent, so that it does not yet reach to the corneal surface of the eyepeduncles. Like in BAKER's type the antero-lateral border of the carapace is produced to a subacute angle just below the eyes, an antennal spine does not occur. There is no small tooth on the pleura of the 5th somite. The telson has a more slender form, being 3,7-times as long as wide proximally and the width at base is not 2,7-, but only 2,1-times as large as the width of the tip, the dorso-lateral spinules, finally, are implanted farther forward (See the Measurements). The left simple leg of the 1st pair appears slightly stouter than in the female from Stat. 273, the propodus, finally, of the 5th pair is slightly shorter than the carpus.

The two egg-bearing females from Makassar agree with the female from Stat. 273, apparently in all details, but they are only 13 mm. long and the rostrum is as short as in the female from Stat. 66, not yet reaching to the cornea of the eyes. The 4th to 6th somite of the abdomen and the telson (Fig. 51*c*) are a little pubescent; two fine setae instead of one are inserted on the tip at each side of the extremity, but in the specimen from Stat. 273 these setae, like those on the lateral margins of the telson, are worn off.

The female from Stat. 89 is almost 13 mm. long and resembles that from Stat. 273, but the antepenultimate joint of the external maxillipeds extends just beyond the antennal scale. Ova 0,45—0,46 mm. long. The female from Stat. 96 is 12 mm. long and shows typical characters, rostrum reaching to the middle of the cornea.

The two young specimens from Stat. 99 proved to be males, after the examination of their 2nd pleopod; owing to their young age the stylamblys appears comparatively shorter than in the male from Stat. 7.

The ova-bearing female from Stat. 109 is but 11 mm. long, like that from Stat. 315. Like in other Caridae the size of ova-bearing females of this species varies rather much, namely between 11 and 17 mm.

Proc. australiensis Baker bears a close resemblance to the european *Proc. canaliculata* Leach, 4 adult specimens of which from the Gulf of Naples are lying before me, BAKER's species, however, apparently differs by its much smaller size — but there are probably

still other slight differences. According to STANLEY KEMP (in: Fisheries, Ireland, Sci. Invest., 1908, I [1910], p. 124) in *Proc. canaliculata* the rostrum falls slightly short of, or extends a little beyond the eye; in *Proc. australiensis*, however, it does not reach to half the length of the ophthalmopods (BAKER) or reaches, like in the "Siboga" specimens, to the middle of the eyepeduncles or even to the middle of the cornea, but extends never beyond the eye. The antennal spine is well-developed in *Proc. canaliculata* and the pleura of the 5th somite are armed with 2 or 3 small acute teeth, in *Proc. australiensis* only with one, though the development of 2 or 3 teeth may be owing to the much larger size of the specimens from Naples. The measurements of the telson and of the three posterior legs of a female, long 34 mm., of *Proc. canaliculata* from the Gulf of Naples accord, as regards their relative proportions, with those of BAKER's species (See the Table of Measurements). I, finally, wish to add that the rostrum of *Proc. canaliculata* closely resembles in a lateral view that of *Proc. australiensis*, with two sharp teeth at the apex, of which the lower is twice as long as the upper and with a few setae between both; in three of the Naples specimens the rostrum shows these characters, but in the fourth, the largest of all, 40 mm. long, it terminates in a single acute point.

Proc. aequimana (Paulson) from the Red Sea is likewise a related form.

Table of Measurements in millimeters.

	1	2	3	4	5	6
Length of telson	2,1	1,7	1,8	1,75	2,2	5,2
Width of telson at base	0,56	0,46	0,62	0,54	0,76	1,6
Width of tip of telson	0,24	0,22	0,24	0,25	0,285	0,68
Distance of the anterior pair of dorso-lateral spinules from the base	0,6	0,26	0,4	0,4	0,44	1,25
Distance of the posterior pair of dorso-lateral spinules from the base	1,3	0,74	1,08	1,04	1,1	2,9
Length of merus of 3rd pair	.	1,4	1,8	1,6	2	4,8
„ „ carpus „ „	.	1,6	1,9	1,6	2,06	5,7
„ „ propodus „ „	.	1,1	1,3	1,2	1,4	3,4
„ „ dactylus „ „	.	0,35	0,35	0,33	0,4	1
„ „ merus of 4th pair	2,1	1,6	2,1	1,85	2,4	5,5
„ „ carpus „ „	2,6	2	2,55	2,25	2,9	7,1
„ „ propodus „ „	1,9	1,4	1,8	1,7	2	4,5
„ „ dactylus „ „	0,47	0,4	0,47	0,42	0,58	1,3
„ „ merus of 5th pair	.	1,5	1,8	1,6	2,1	4,3
„ „ carpus „ „	.	1,3	1,5	1,4	1,84	3,7
„ „ propodus „ „	.	1,2	1,6	1,5	1,9	3,4
„ „ dactylus „ „	.	0,33	0,47	0,42	0,50	

N° 1 Stat. 7; N° 2 Stat. 66; N° 3 Stat. 71; N° 4 adult female from Stat. 109; N° 5 Stat. 273; N° 6 female, without eggs, long 34 mm., of *Proc. canaliculata* Leach from the Gulf of Naples.

General distribution: South Australian coast (BAKER).

2. *Processa* sp. Pl. XVII, Fig. 52—52*p*.

Stat. 4. March 9. 7°42' S., 114°12'.6 E. Anchorage off Djangkar (Java). 9 m. Bottom coarse sand. 1 young male and 1 ova-bearing female.

Stat. 96. June 27. South-east side of Pearl-bank. Sulu-archipelago. 15 m. Lithothamnion-bottom. 1 egg-bearing female.
Stat. 104. July 2/3. Sulu-harbour, Sulu-island. 14 m. Bottom sand. 1 specimen.
Stat. 154. Aug. 14. 0°7'.2 N., 130°25'.5 E. N.W.-coast of Waigeu-island. 83 m. Bottom grey muddy sand, shells and Lithothamnion. 1 young female.
Stat. 193. Sept. 13/14. Sanana-bay, East coast of Sula Besi. 22 m. Bottom mud. 1 almost adult female.
Stat. 261. Dec. 16/18. Elat, west coast of Great-Kei-island. 27 m. Bottom mud. 2 young males.

I not succeed in identifying these specimens with any one of the described species, they may even perhaps prove to belong to three or four different forms. The largest specimen, that from Stat. 193, is 21,5 mm. long, but the three posterior peraeopods are wanting or incomplete; the other specimens are considerably smaller, though one of them is laden with eggs. The specimens not fully agree in some minute details, as e. g. the shape of the carpal segments of the legs of the 2nd pair, the position of the dorso-lateral spinules on the telson etc., so that under these circumstances it appears more adequate to describe these specimens without referring them to a known species. Dr. BALSS rightly remarks that a revision of the species of *Processa* is very desirable (Ostasiatische Decapoden II, 1914, p. 60).

The female from Stat. 193 is 21,5 mm. long (rostrum 1,64 mm., carapace 4,92 mm., abdomen with telson 15 mm.). The greatest height laterally of the carapace is 2,85 mm., so that the carapace, rostrum included, proves to be $2^1/_3$-times as long as high. The rostrum, (Fig. 52, 52*a*, 52*b*), almost as long as the eyes, extends horizontally forward, but the acute apex of the upper margin is slightly curved downward; the acute spine or tooth at the end of the lower border reaches a little farther forward than the apex of the upper and in the notch between both teeth a few setae are implanted; looked at from above the rostrum appears styliform, gradually tapering forward from the slightly wider base, and in a lateral view it appears also rather low, decreasing in height distally.

Outer orbital angle rounded. Antennal spine well-developed. Antero-inferior angle of carapace rounded. Carapace smooth, 3-times as long as the rostrum.

The abdomen, also smooth, is nearly 3-times as long as the carapace without the rostrum. Abdominal pleura rounded, that of the 5th somite entire, not toothed, postero-inferior angle of the 6th somite acute. The telson, 3 mm. long, (Fig. 52*c*, 52*d*, 52*e*) measures one-fifth the whole length of the abdomen and is about half as long as carapace and rostrum combined; it tapers rather strongly, the width of the tip being only one-third that of the base, and it is slightly grooved longitudinally; dorso-lateral spinules large, the anterior pair at $^1/_7$ the length of the telson from the base, the posterior pair on the middle; of the 2 terminal spines, at either side of the subacute apex, the inner one is the longest, 3-times as long as the lateral, and between the two long spines two finely and closely feathered setae are implanted that are nearly just as long.

Eyes large, flattened; a small dark-coloured ocellus, that occurs in a species from the Hawaiian Islands, referred by Miss RATHBUN to *Processa processa* (Bate), could not be observed (M. J. RATHBUN, The Brachyura and Macrura of the Hawaiian Islands, 1906, p. 912).

Antennular peduncle slender, basal joint a little longer than the two following taken together; 2nd joint 5-times as long as thick and twice as long as 3rd. A stylocerite does not occur.

Antennal scale narrow, as long as the antennular peduncle; outer margin straight, terminal spine not or hardly reaching beyond the lamella; in BATE's figure of *Proc. processa* (Report Challenger Macrura, Plate XCV, fig. *c*) the spine is much shorter, perhaps rudimentary. Antennal peduncle a little longer than the basal joint of that of the inner antennae, spine at the antero-inferior angle of 2nd joint very small. The antennal scale, which in this specimen is 3,84 mm. long, measures about three-fourths the length of the carapace without the rostrum and one-fourth the length of the body.

The external maxillipeds (Fig. 52*f*) reach beyond the antennal scale by the terminal joint and one-third of the penultimate; these two joints are of equal length, respectively 1,84 mm. and 1,8 mm. long, and together about one-fifth shorter than the antepenultimate. They resemble the outer maxillipeds of *Proc. processa* (Bate) (l. c. Fig. 1), but I would remark that in the figure 1*i* of this author the two joints appear together one-third shorter than the antepenultimate.

The merus of the right chelate leg of the 1st pair (Fig. 52*g*) reaches to the middle of the eyes; in a lateral view the carpus appears $2^1/_2$-times as long as thick at the distal extremity, palm just as long as carpus, fingers one-third shorter. The merus of the left leg (Fig. 52*h*) is slender, 8-times as long as broad, carpus a little longer than one-third of the merus, 4-times as long as thick at the distal extremity, propodus half as long as the merus, almost 6-times as long as broad proximally, distinctly narrowing, dactylus almost one-third of the propodus.

Of the right leg of the 2nd pair (Fig. 52*i*) the merus extends to the far end of the antennal peduncle and this leg projects by the chela and two-fifths of the carpus beyond the antennal scale; it remained uncertain whether the merus is subdivided or not, the carpus, almost twice as long as the merus, has about 20 articulations, that are longer than broad, those in the middle twice as long as broad, the last segment almost twice as long as broad and nearly as long as the two preceding together, that are but little longer than broad; the chela measures almost one-sixth of the carpus and is four-times as long as broad, fingers hardly shorter than palm. Of the left leg of the 2nd pair the merus reaches to the middle of the eyes, while only the chela and the last joint of the carpus project beyond the antennal scale; the proportion between merus and carpus is like 4 : 7, the merus probably subdivided; the carpus has 15 segments, the 1st or proximal measures nearly one-sixth the length of the joint and is 5-times as long as thick, the 3rd $2^1/_2$-times as long as broad, those in the middle one and a half as long as thick, the following relatively still shorter, the penultimate even a little broader than long, the last segment one and a half as long as thick and as long as the two preceding taken together; the chela measures one-sixth of the carpus and is 3-times as long as broad, fingers slightly longer than palm.

The following legs are wanting or incomplete; of those of the 3rd pair the merus reaches as far forward as the 1st joint of the antennular peduncle and the merus of the 4th pair extends but little farther.

The branches of the 2nd pleopod are narrow, the inner little shorter than the outer; the stylamblys with well-developed cincinnuli measures about one-fourth the length of the endopodite.

At first I was inclined to refer this specimen to *Proc. processa* (Bate), but according to BATE's figure *l* the carpal segments show a different form, being not or hardly longer than wide.

The form, however, referred by Miss RATHBUN (l. c.) to *Proc. processa*, belongs in my opinion to another species on account of the much larger number of carpal segments and of the eyes being furnished with a small but distinct ocellus.

The young male from Stat. 4 is only about 9 mm. long. The merus of the left simple foot (the right chelate leg of the 1st and 2nd pair and the legs of the 4th and 5th pair are lost) is 1 mm. long; the carpus, 0,36 mm. long and 0,14 mm. thick distally, has a stouter shape than in the preceding specimen, like also the propodus, which, 0,52 mm. long, is but 3-times as long as broad. Proportion between merus and carpus of the left leg of the 2nd pair like 3 : 5; carpus (Fig. 52*f*) with 10 segments, which, excepting the 1st and the last, are about as long as thick: the chela measures one-fourth of the carpus and has a stouter shape than in the preceding specimen, being only twice as long as broad, fingers a little shorter than palm. As results from the Table of Measurements the dorso-lateral spinules of the telson are situated more backward than in the specimen from Stat. 193, with which it agrees for the rest. Endopodite of 2nd pleopod a little shorter than the outer branch, bearing at the posterior third a stylamblys and an appendix masculina; the latter, implanted between the branch and the stylamblys, has 4 setae on the tip, while the slightly shorter stylamblys is provided with distinct cincinnuli.

The egg-bearing female from this Station is hardly 12 mm. long and has lost all the peraeopods, excepting the right chelate leg of the 1st and the right leg of the 2nd pair. The chelate leg of the 1st pair shows the same measurements as the specimen from Stat. 261, that belongs to the same species as the male from Stat. 4 and the leg of the 2nd pair agrees in its measurements with the left leg of the 2nd pair of this male, but the 9 segments of the carpus are distinctly longer than thick and the chela is a little more than 3-times as long as broad in the middle, presenting a less stout shape than in the male. The telson also differs from that of the male by its more slender form and by the dorso-lateral spinules being implanted like in the female from Stat. 193, with which is seems to agree for the rest, the rostrum being little shorter than the eyes, while the 2nd joint of the antennular peduncle is 3-times as long as thick and one and a half as long as the 3rd. Larger diameter of the eggs 0,4 mm.

The egg-bearing female from Stat. 96 has nearly the same size as the young male from Stat. 4. The carpus (Fig. 52*o*) of the left leg of the 2nd pair has 12 segments that resemble those observed in the young male from Stat. 4, but the chela is 3-times as long as broad and the fingers are nearly as long as the palm. The right leg of the 2nd pair is hardly longer than the left, has likewise 12 segments in the carpus and resembles also in other respects its fellow.

The specimen from Stat. 104 is about 12 mm. long; it is much damaged, having lost all its legs excepting one of the 3rd pair. This specimen belongs without any doubt to the same species as the female from Stat. 4, presenting the same form of telson, the same position of the dorso-lateral spinules, the same form of antennules etc.

The specimen from Stat. 154 (Fig. 52*j*, 52*k*) is little longer than the egg-bearing female from Stat. 96 and belongs perhaps to a third species. The pleura of the 5th somite (Fig. 52*l*) bear namely a small tooth posteriorly and the dorso-lateral spinules of the telson (Fig. 52*m*) are placed more backward. The carpus (Fig. 52*n*) of the left leg of the 2nd pair, almost twice

as long as the merus, is divided into 24 segments, which, excepting the 1st and the last, are all a little broader than long; the chela measures about one-fourth of the carpus and is 4-times as long as broad in the middle, while the fingers are a little shorter than the palm. This specimen belongs probably to the true *Proc. processa* (Bate).

The two small specimens from Stat. 261, finally, are of the same size as the young male from Stat. 4 and belong to the same species as is proved by the left leg of the 2nd pair, which closely resembles that of the young male from off Djangkar; the carpus of this leg has, however, only 11 segments, of which the penultimate and antepenultimate are even slightly broader than long. The chela is only twice as long as broad and the fingers are slightly shorter than the palm.

As regards the form and the length of the rostrum all the specimens resemble one another.

The preceding observations, in connection with the measurements, render it probable that the specimens from the Stations 4 and 261 belong to the same species and that those of the three other Stations belong to three other different forms.

Table of Measurements in millimeters.

	1	1a	2	3	4	5
Length of telson	1,1	1,72	2	2	3	1,6
Width of telson at base	0,4	0,5	0,5	0,6	0,94	0,55
Width of tip of telson	0,14	0,22	0,19	0,18	0,31	0,2
Distance of the anterior pair of dorso-lateral spinules from the posterior margin of the 6th somite	0,36	0,24	0,4	0,74	0,42	0,48
Distance of the posterior pair of dorso-lateral spinules from the posterior margin of the 6th somite	0,78	0,94	1,1	1,34	1,52	1,04
Length of the carpus of the chelate leg of the 1st pair	.	0,4	0,56	0,7	1	0,52
Width of this carpus in a lateral view	.	0,23	0,28	0,28	0,4	0,26
Length of the palm of this leg	.	0,46	0,56	0,75	1,06	0,56
Length of the fingers of this leg	.	0,34	0,42	0,46	0,72	0,46
Length of the merus of the simple leg of the 1st pair	1	.	1,5	1,9	3	1,5
Length of the carpus of this leg	0,36	.	0,6	0,76	1,14	0,6
Length of the propodus of this leg	0,52	.	0,8	1	1,48	0,75
Length of the dactylus of this leg	.	.	0,3	0,3	0,44	0,26
Length of the merus of the right leg of the 2nd pair	.	1,02	1,35	.	2,64	.
" " " carpus of the right leg of the 2nd pair	.	1,6	2,02	.	4,84	.
" " " chela of the right leg of the 2nd pair	.	0,36	0,52	.	0,74	.
Length of the merus of the left leg of the 2nd pair	0,75	.	1,26	1,44	2	1
" " " carpus of the left leg of the 2nd pair	1,25	.	1,85	2,7	3,5	1,8
" " " chela of the left leg of the 2nd pair	0,28	.	0,48	0,58	0,58	0,36
Length of the merus of the leg of the 3rd pair	.	.	1,5	2	.	1,46
" " " carpus of the leg of the 3rd pair	1,06	.	1,5	2,56	,	1,7
" " " propodus of the leg of the 3rd pair	0,72	.	1,08	1,4	.	1
" " " dactylus of the leg of the 3rd pair	0,37	.	0,34	0,48	.	0,42
Length of the merus of the leg of the 4th pair	.	.	1,8	2,6	.	1,5
" " " carpus of the leg of the 4th pair	.	.	2,1	3,7	.	2,2
" " " propodus of the leg of the 4th pair	.	.	1,5	2,2	,	1,3
" " " dactylus of the leg of the 4th pair	.	.	0,38	0,72	.	0,58

			1	1a	2	3	4	5
Length of the merus	of the leg of the 5th pair	. . .	.	.	1,66	2,5	.	1,62
„ „ „ carpus		. . .	.	.	1,5	2,4	.	2
„ „ „ propodus		. . .	.	.	1,48	2,2	.	1,6
„ „ „ dactylus		. . .	.	.	0,32	0,82	.	0,6

N° 1 the young male, N° 1a the ova-bearing female from Stat. 4; N° 2 egg-bearing female from Stat. 96; N° 3 young female from Stat. 154; N° 4 female from Stat. 193; N° 5 young male from Stat. 261.

3. *Proccssa japonica* (de Haan). Pl. XVIII, Fig. 53—53*k*.

Nika japonica W. de Haan, Fauna japonica, Crustacea, 1849, p. 184, Tab. XLVI, fig. 6 and Tab. N.
Nika japonica A. Ortmann, in: Zool. Jahrb. V. Abth. f. Syst. 1890, p. 529.
Nika japonica F. Doflein, Ostasiatische Dekapoden, München, 1902, p. 641.
Nica japonica H. Balss, Ostasiatische Decapoden II. Die Natantia und Reptantia. München, 1914, p. 61.

Stat. 71. May 10—June 7. Makassar and surroundings. Up to 32 m. Bottom mud. Sand with mud. Coral. 1 young male.
Stat. 164. August 20. 1°42′.5 S., 130°47′.5 E. Between Misool and New Guinea. 32 m. Bottom sand, small stones and shells. 1 specimen.
Stat. 313. Febr. 14/16, 1900. Anchorage East of Dangar Besar, Saleh Bay. Up to 36 m. Bottom sand, coral and mud. 1 young female.

Upon my request Dr. J. J. Tesch, at that time Conservator at the Leyden Natural History Museum, has been so kind to examine for me the three type specimens of de Haan's *Nika japonica*, still preserved in that institution, viz. two specimens in a dry state, long respectively 44,5 mm. and 40 mm. from tip of rostrum to tip of telson, and one ova-bearing female in spirit, long 22 mm.

The largest of the three specimens, collected by the "Siboga", is that from Stat. 164, of which the sex could not be ascertained, because the pleopods of the 2nd pair are damaged; this specimen is 28 mm. long. The carapace, rostrum included, is 9,1 mm. long, nearly one-third the entire length, and 1,9 mm. high in a lateral view, so that it shows a rather slender shape, being almost 5-times as long as high: the shape of carapace and abdomen is more slender than in de Haan's figure, but this species shows probably similar variations as *Proc. canaliculata* Leach (vide S. Kemp, The Decapoda Natantia of the coasts of Ireland, Dublin 1910, p. 124).

The upper border of the carapace appears straight in a lateral aspect and terminates anteriorly (Fig. 53, 53*a*) into the t r i a n g u l a r rostrum that is a little shorter than the eyes; the rostrum, a s l o n g a s b r o a d a t b a s e, appears s l i g h t l y curved transversely, when looked at from before, and appears anteriorly obtusely carinate in the mid-dorsal line, the carina fading away in the middle; the lateral margins are also carinate and in a lateral view the rostrum appears very low, the apex obtuse. The specimen from Stat. 313, which is a little smaller, carapace and rostrum being together 7,5 mm. long, shows the same characters of the rostrum, but in the young female from Stat. 71, in which carapace and rostrum are together only 5 mm. long, the rostrum is a little longer than broad at base. Both by de Haan and Ortmann the rostrum

has been described as convex. Antennal spine acute, small. Antero-inferior angle of carapace rounded. Carapace smooth, without grooves.

Abdomen smooth, rounded, anterior and posterior angles of the pleura rounded or obtuse, those of the 5th and 6th somite without teeth or spines. Telson of the specimen from Stat. 164 5,7 mm. long, one-fifth the whole length, strongly tapering backward, the width (0,28 mm.) of the tip being only one-fifth that of the base; the telson is rounded transversely, not grooved longitudinally, pubescent and it appears unarmed to the naked eye, while only by means of the microscope the two pairs of rudimentary, very small spinules can be observed, that are only 0,08 mm. long, the anterior pair situated at the anterior third (at 1,8 mm. from the base), the posterior pair just behind the middle (at 3,5 mm. from the base). In the specimen from Stat. 313 the telson tapers a little less strongly, the width of the tip being one-fourth that of the base; for the rest it resembles that of the specimen from Stat. 164, but the dorso-lateral spinules are hardly perceptible even by means of the microscope and the posterior pair is situated more backward, at the posterior fourth. At either side the tip bears two spinules, the outer very short, the inner only as long as the tip is broad, conformable to DE HAAN's description "spinulis apicalibus valde abbreviatis". In the youngest specimen, the female from Stat. 71, the telson is 2,7 mm. long, 0,7 mm. broad at base and 0,23 mm. at the tip, appearing anteriorly only 3-times as broad as at the tip, so that we may conclude that the telson tapers the more strongly the older the animal is; in this youngest specimen the dorso-lateral spinules are also only perceptible under the microscope, the anterior pair is situated nearly at the anterior third, the posterior at three-fifths the length of the telson from the base, namely at 1,7 mm.

Concerning the types of *Nika japonica* Dr. TESCH wrote me that in the two larger dry specimens no spinules were perceptible, at best one observes with a magnifying glass one or two pairs of minute tubercles; in the specimen, preserved in spirit, two pairs of small spinules became visible when magnified 10-times and looked at laterally.

According to Dr. DOFLEIN the telson of the female should, like in *Proc. canaliculata* Leach, be furrowed and armed with two pairs of fine spinules, so that at least in the female small spinules, visible for the naked eye, seem sometimes to occur.

In the specimen from Stat. 164 the eyes reach to midway between the orbital margin and the distal extremity of 1st antennular article. Antennular peduncle in this specimen 5 mm. long, a little more than half as long as the carapace, rostrum included, and slender, 12-times as long as thick; the 2nd and the 3rd joint, together 1,8 mm. long, are together a little more than half as long as the distance between the orbital margin and the distal extremity of 1st article, the 2nd joint is 3-times as long as thick and one and a half as long as the 3rd; stylocerite reaching to the distal third of basal article, with rounded tip. The slender antennal peduncle, of which the 2nd joint is unarmed, extends almost to the distal extremity of 2nd antennular article. The specimen from Stat. 313 agrees with the described, but the antennal peduncle extends to the distal extremity of the 2nd joint of the antennular peduncle. Scaphocerite in this specimen just half as long as the carapace, rostrum included (in the specimen from Stat. 164 both scaphocerites are wanting); terminal spine reaching as far as the oblique tip of the lamella.

In the young specimen from Stat. 71, finally, the 2nd joint of the antennular peduncle is only twice as long as thick and just as long as the 3rd: this difference from the two other specimens may be caused by its young age or it may be a variation also known in *Proc. canaliculata* (S. Kemp, l. c.).

In the specimen from Stat. 164 that has lost the scaphocerites, the external maxillipeds extend by the ultimate and half the penultimate joint beyond the distal extremity of the antennular peduncle; in the female from Stat. 313 they reach by the terminal and two-fifths the penultimate joint beyond the scaphocerite, which is but a trifle longer than the antennular peduncle. In the specimen from Stat. 164 the antepenultimate joint is 5,5 mm. long, the penultimate 1,8 mm., the ultimate 2 mm., so that the two last joints measure together slightly more than two-thirds the antepenultimate joint, and the same proportion is shown by the young female from Stat. 313, in which the antepenultimate joint is 4,3 mm. long, the penultimate 1,56 mm. and the ultimate 1,4 mm., though here the terminal joint appears a little shorter than the penultimate. According to DE HAAN the two last joints should be together half as long as the antepenultimate, but Dr. TESCH informed me that in the dry type specimens the two last joints measure together a little more than five-eighths the antepenultimate and that they are larger than in DE HAAN's figure on Plate N of his work, so that he believes this figure to be not quite exact; unfortunately in the type preserved in spirit the external maxillipeds are lost.

In the specimen from Stat. 164 the right chelate peraeopod of the 1st pair reaches to the middle of 3rd antennular article, while the left simple foot reaches by the dactylus beyond it. The carpus of the chelate leg has a stout shape, being only about one and a half as long as broad or thick distally, when looked at from above; it is nearly as long as the fingers, but both carpus and fingers are a little shorter than the palm. The cylindrical carpus of the simple foot is as long as that of the chelate, but almost twice as long as thick; the propodus, nearly 4-times as long as broad proximally and narrowing distally, is almost twice as long as the carpus and the curved dactylus measures one-third of the propodus.

The right leg of the 2nd pair is nearly 17 mm. long in the specimen from Stat. 164, more than half as long as the body, and reaches by the whole carpus and chela beyond the antennular peduncle; the merus is subdivided into 15, the carpus into 45 segments; the chela is very small, one-third longer than the last segment of the carpus, but less broad and the dactylus is strongly curved; the left leg is wanting. In the specimen from Stat. 313 the right leg resembles that of the preceding specimen, but the number of the segments both of merus and carpus is a little larger; the much shorter and thicker left leg reaches by the chela and one-third the carpus beyond the antennal scale, the merus of this leg has 5 or 6 segments, of which the 1st or proximal one is half as long as the joint and as long as the following combined, the carpus has 17 joints; chela larger than in the right leg, more than one and a half as long as the last joint of the carpus, fingers gaping, shorter than the palm, dactylus not so strongly curved as in the other leg. According to DE HAAN the left leg should not reach beyond the antennal scale, but Dr. TESCH wrote me that in the type specimen, preserved in spirit, it extends beyond the antennal scale as far as the scale is

long and that also in one of the dry specimens (in the other both legs are lost) the left leg reaches beyond it.

In the specimen from Stat. 164 and in that from Stat. 313 the peraeopods of the 3rd pair project by the dactylus, the propodus and one-third or fourth of the carpus beyond the external maxillipeds; the two following pairs are wanting. In the legs of the 3rd pair the carpus is a little longer than the merus, the propodus just half as long as the carpus and the dactylus measures one-third the propodus. In the young male from Stat. 71 the three posterior legs are present; as is shown by the measurements the 5th pair agrees in length with the 3rd, except the dactylus which is a little longer, while the 4th legs are longer than those of the 3rd and 5th pair.

In the pleopod of the 2nd pair of the young male from Stat. 71 the exopodite is about one-fourth longer than the protopod. At the proximal third of the inner branch, which is but little shorter than the outer, two appendages are implanted: at the outer side a slender stylamblys that measures somewhat more than one-fifth the length of the endopodite and that bears a cluster of cincinnuli at the tip, and between the stylamblys and the branch an appendix masculina, that is a little more than twice as long as the stylamblys, the proportion being as 16 : 7; the appendix masculina is slender, 16-times as long as thick and carries 3 setae of unequal length at the tip. In the much larger female from Stat. 313 the stylamblys measures but one-sixth the length of the endopodite. Both branches are rather narrow.

Table of Measurements in millimeters:

	1	2	3
Length of telson	2,7	5,7	4,4
Width of telson at base	0,7	1,50	1
Width of tip of telson	0,23	0,28	0,26
Distance between the base of the telson and the anterior pair of spinules	0,8	1,8	spinules
Distance between the base of the telson and the posterior pair of spinules	1,7	3,5	invisible
Length of the carpus of the chelate leg	0,6	1,1	0,9
Width of this carpus anteriorly	0,43	0,8	0,50
Length of the palm of this leg	0,6	1,3	1
Length of the fingers of this leg	0,45	1,04	0,64
Length of the carpus of the simple leg	0,5	1,14	0,9
Width „ „ „ „ „ „ „	0,4	0,64	0,5
Length of the propodus „ „ „ „	1	2	1,6
Length of the dactylus „ „ „ „	0,35	0,65	0,52
Length of the merus of the third leg	1,9	4,4	3,6
„ „ „ carpus „ „ „ „	2,06	4,8	3,9
„ „ „ propodus „ „ „ „	1,2	2,4	1,9
„ „ „ dactylus „ „ „ „	0,38	0,72	0,64
Length of the merus of the fourth leg	2,16		
„ „ „ carpus „ „ „ „	2,85		
„ „ „ propodus „ „ „ „	1,7		
„ „ „ dactylus „ „ „ „	0,45		
Length of the merus of the fifth leg	1,9		
„ „ „ carpus „ „ „ „	1,9		
„ „ „ propodus „ „ „ „	1,7		
„ „ „ dactylus „ „ „ „	0,44		

General distribution: Japan (DE HAAN); Bay of Tokyo, Kadsiyama (ORTMANN); Nagasaki (BALSS). The locality, mentioned by DOFLEIN, Iterup, Kurile Islands, is not quite certain, according to Dr. BALSS.

Family GLYPHOCRANGONIDAE.

Of the remarkable and very natural family of Glyphocrangonidae hitherto only one or two species were known to inhabit the Indian Archipelago, namely *Glyphocrangon regalis* Bate and *Glyph. granulosis* Bate, both obtained by the "Challenger" and of which the former was taken off Banda Islands, the latter between New Guinea and the Admiralty Islands. The Siboga Expedition, however, has not only found again these two, but has moreover discovered seven other species, of which five proved to be new to science: owing to the great activity of our dutch expedition we are therefore at present acquainted with nine species of Glyphocrangonidae living in the Indian Archipelago, nearly as many as occur in the seas of British India, while the total number of known species has increased from twenty five to thirty.

By far the greater part of the species are found in the Indopacific, including the west coast of America, for only seven are known from the Atlantic and of these one occurs moreover also in the Indopacific. Two species, *Glyph. sculpta* (S. I. Smith) and *longirostris* (S. I. Smith) are found off the east coast of the United States; according to the Reverend STEBBING both should also occur at Cape Point, South Africa, and a single specimen of *Glyph. longirostris* was captured by the s. s. Helga off the west coast of Ireland. Four species, *Glyph. aculeata* A. M.-Edw., *neglecta* Faxon, *nobilis* A. M.-Edw. and *spinicauda* A. M.-Edw, are recorded from the Caribbean Sea and the Gulf of Mexico, the first has moreover been captured by the "Challenger" off Pernambuco. The last form, observed in the Atlantic Ocean, is *Glyph. rimapes* Bate, that was taken by the same expedition between Buenos Ayres and Tristan da Cunha; the range of this species is, however, almost cosmopolitan, for it was obtained by the "Challenger" also near Juan Fernandez and near Yokohama. Besides *Glyph. rimapes* only one other species, *Glyph. hastacauda* Bate, is known from Japan and only three others from the Pacific: *Glyph. acuminata* Bate from near the Fiji Islands, *granulosis* Bate from between New Guinea and the Admiralty Islands and, finally, *regalis* Bate, which is recorded, besides from off Banda Islands and three other localities in the Indian Archipelago, also from north of the Kermadec Islands and from off Matuku, Fiji Islands.

Five species are recorded from the west coast of Mexico, the Gulf of Panama and the Galapagos Islands, namely: *Glyph. alata*, *loricata*, *sicaria*, *spinulosa* and *vicaria*, all described and figured by WALTER FAXON in his valuable work on the Stalk-eyed Crustacea, obtained by the U. S. Fish Commission Steamer "Albatross". *Glyph. podager* Bate is still only known by one single specimen, a female, which was taken by the "Challenger" near Marion Island in the southern Indian Ocean, halfway between the Cape of Good Hope and the Kerguelen Islands.

The Indian Ocean, north of the Equator, is inhabited by no less than ten species, firstly *Glyph. Investigatoris* W.-Mas. with the variety *andamanensis* W.-Mas., that occur as well in

the Arabian Sea as in the Bay of Bengal, but that are probably identical with *Glyph. regalis* Bate. The Arabian Sea is the habitat of still four other species, one of which, *Glyph. cerea* Alcock & Anderson, belongs to the subgenus *Plastocrangon*, in which the eyes are small and in life of an opaque yellow-ochre colour; the three others are *Glyph. prionouota* W.-Mas., *Smithii* W.-Mas., and *unguiculata* W.-Mas., of which the first should perhaps be regarded as a local variety of *Glyph. granulosis* Bate. Besides *Glyph. Investigatoris* six species were observed in the Bay of Bengal and the Andaman Sea, firstly *Glyph. caeca* W.-Mas. and *caecescens* W.-Mas., that both belong to *Plastocrangon* and of which the former was also taken on the Saya de Malha Bank, furthermore *Glyph. hastacauda* Bate, *Gilesii* W.-Mas. and *Smithii* W.-Mas.; finally a form obtained by the "Investigator" off the Arakan Coast, which was referred by Mac Gilchrist with some doubt to *Glyph. longirostris* (S. I. Smith), but which is probably different.

The nine species which are at present known to occur in the Indian Archipelago, are *Glyph. regalis* Bate, *hastacauda* Bate, *granulosis* Bate, furthermore the new species *pugnax*, *assimilis*, *Sibogae* and *megalophthalma*, finally *Glyph. cacca* W.-Mas. and *Faxoni* de Man, that both belong to the subgenus *Plastocrangon*.

It results from the preceding that nearly two-thirds of the total number of species of the genus *Glyphocrangon*, the only one of the family, are found in the tropical seas and that the geographical distribution of the greater part is rather small and limited. The only species, indeed, which are widely distributed, are *Glyph. rimapes* Bate, already mentioned, *Glyph. hastacauda* Bate that ranges from Japan through the Indian Archipelago to the Bay of Bengal, and the two species from the east coast of the United States, *Glyph. longirostris* and *sculpta*, that are also recorded from South Africa, while the former has even been observed off the west coast of Ireland, the most northern locality where a *Glyphocrangon* has been taken. Of the species of the subgenus *Plastocrangon* one, *Glyph. caeca* W.-Mas., is distributed from the Saya de Malha Bank to New Guinea.

Though all the species of *Glyphocrangon* are found in deep water, the depth at which they occur, varies, however, rather considerably according to the species, so that the reader is referred to the List of the known Species at p. 214. When this List is looked over, nearly one-third prove to have been captured at great depths surpassing 1000 fathoms and the maximum depth recorded appears to be that of *Glyph. rimapes* Bate, which was trawled near Yokohama at 1875 fathoms. We learn also that some species occur at moderate, other ones at great depths and that the depth generally not varies exceedingly much, when the species was found at different Stations. The smallest depths at which species were taken, proved to be 142 and 160 fathoms respectively for *Glyph. Investigatoris* and *Glyph. Faxoni*. The species of the subgenus *Plastocrangon* do not seem to live at constantly greater depths than those of the typical genus, for, though *Glyph. caecescens* was taken at 1748 fathoms, *Glyph. caeca* occurs in water of 300 fathoms on the Saya de Malha Bank and, as already mentioned, the new *Glyph. Faxoni* was found in the Bali Sea at 160 fathoms.

LIST OF ALL THE SPECIES OF GLYPHOCRANGON A. M.-EDW., KNOWN AT PRESENT.

SPECIES	HABITAT	DEPTH IN FATHOMS
aculeata A. M.-Edw. 1881 . . .	St. Vincent (Antilles)	593
	Off Pernambuco	675
	Lat. 24° 36′ N., long. 84° 5′ W.	955
	Off Guadeloupe	769, 878
	Off Dominica	542
	Off Martinique	502½
	Off Grenada	576
	South of Jamaica	322 [1]
acuminata Bate 1888	Near the Fiji Islands	1350
alata Faxon 1893	Gulf of Panama	730
	Off Acapulco	600
assimilis de Man 1918	Bali Sea	294
caeca (Plastocrangon) W.-Mas. 1891	Bay of Bengal near the Andamans	501
	Saya de Malha	300—500
	Between Ceram and New Guinea	505
caecescens (Plastocrangon) W.-Mas. 1891	Bay of Bengal	1748
cerea (Plastocrangon) Alcock & Anderson 1894	Arabian Sea, between the Laccadives and Maldives	719
Faxoni (Plastocrangon) de Man 1918.	Bali Sea	100
	Between the islands of Rotti and Timor	284
Gilesii W.-Mas. 1891	Andaman Sea	370—419
		405, 490, 500
granulosis Bate 1888	Between New Guinea and Admiralty Islands	1070
	Northern part of the Strait of Makassar	711
hastacauda Bate 1888	Off Japan	345
	North of Sumbawa	380, 434
	East of Kofiau-island	436
	Bay of Bengal, off Ceylon	594—225, 609
Investigatoris W.-Mas. 1891 . .	Bay of Bengal	145—594
Investigatoris var. *andamanensis* W.-Mas. 1891	Arabian Sea	142—595
	Andaman Sea	188—405
longirostris (S. I. Smith) 1882.	Off the east coast of the United States	1043—1073
	Off the South African Coast	660—800
	Off the west coast of Ireland	900
longirostris Mac Gilchrist 1905.	Off the Arakan Coast	1100
lorentzi Faxon 1895	Galapagos Islands	331, 421

1) In his paper "Supplementary Notes on the Crustacea" of Nov. 1896 FAXON indicates for the Station VIII of the "Blake" a depth of 610 fathoms, while in the List of the Stations of this expedition in: Bull. Mus. Comp. Zool. Vol. VI, N° 1, Sept. 1879, for the Station VIII the depth of 322 fathoms is mentioned.

SPECIES	HABITAT	DEPTH IN FATHOMS
megalophthalma de Man 1918 .	Flores Sea	1126
	Strait of Makassar	1109
	South of Muna Island	1031
neglecta Faxon 1896.	Off Grenada	340, 291
	Off Montserrat	303
nobilis A. M.-Edw. 1881	Lat. 23°42′ N., long. 83°13′ W.	860
	Off Frederickstadt, Santa Cruz	451
	Off Guadeloupe	734, 878
	Off Dominica	333, 391, 824, 1131
	Off Martinique	357
	Off St. Lucia	422
	Off St. Vincent	573
podager Bate 1888.	Near Marion Island	1375
prionouota W.-Mas. 1891	Arabian Sea in the neighbourhood of the Laccadives and northwards	865—1022
pugnax de Man 1918	Between the islands of Rotti and Timor	284
regalis Bate 1888	Off Matuku, Fiji Islands	315
	North of the Kermadec Islands	600
	Off Banda Island	200
	Off Makassar	246
	Strait of Makassar	396
	Paternoster-islands	285
rimapes Bate 1888.	Near Juan Fernandez	1375
	Near Yokohama	1875
	Between Buenos Ayres and Tristan da Cunha	1715
sculpta (S. I. Smith) 1882 . . .	Off the east coast of the United States	1098—1395
	Cape Point, South Africa	800—900
Sibogae de Man 1918	Bali Sea	556
	Flores Sea	434
sicaria Faxon 1893	Gulf of Panama	1793
Smithii W.-Mas. 1891.	Bay of Bengal near the Andamans	561
	Andaman Sea	188—220
	Arabian Sea, off the Maldives	459
spinicauda A. M.-Edw. 1881 . .	Off St. Kitts	208, 250
	Off Barbados	209, 218, 288
spinulosa Faxon 1893	Off Mariato Point	695
	Off Acapulco	660, 772
	Near Las Tres Marias	676, 680
	Gulf of California	859
unguiculata W.-Mas. 1891 . . .	Arabian Sea, in the neighbourhood of the Laccadives and northwards	740, 770, 824, 947
vicaria Faxon 1896	Off Cocos Island	770, 978, 1067
	On course from Cocos Island to Malpelo Island	1132, 1201
	Gulf of Panama	1270
	Between Galera Point and Galapagos Islands	1322
	Galapagos Islands	1189
	Between Galapagos Islands and Acapulco	1360
	Off Acapulco	772
	Gulf of California	995

Key to the Species of the genus *Glyphocrangon* A. M.-Edw., known at present[1]).

a_1 Anterior moiety of the fourth or lateral crest of the carapace not continuous with the branchiostegal spine.

b_1 Anterior moiety of the fourth or lateral crest of the carapace produced and expanded at its anterior end into a single huge vertically-compressed spine, that extends far beyond the level of the orbital margin.

c_1 Posterior moiety of the third carapacial crest produced anteriorly into a spine.

d_1 Spine at the anterior extremity of the posterior moiety of the third carapacial crest large.

Rostrum measuring about two-thirds the length of the rest of the carapace in the middle line and about 4-times as long as broad . . . . . *aculeata* A. M.-Edw.

(A. Milne-Edwards, in: Annal. Scienc. Natur., Zoologie, 1881, Art. N° 4, p. 5 and Recueil de Figures de Crustacés nouveaux ou peu connus, Avril 1883, Plate 38.)

d_2 Spine at the anterior extremity of the posterior moiety of the third carapacial crest small.

Rostrum measuring more than four-fifths the length of the rest of the carapace in the middle line and 6-times as long as broad *Smithii* W.-Mas.

(A. Alcock, A descript. Catal. Indian Deep-Sea Crust., Calcutta 1901, p. 129.)

c_2 Posterior moiety of the third carapacial crest not produced anteriorly into a spine.

d_1 Anterior moiety of the fourth carapacial crest toothed along its posterior half.

Behind the anterior pair of rostral spines the rostrum is armed on each side with 3 to 5 smaller marginal spines. Carapace and abdomen densely tuberculated . . . . . *alata* Faxon

(W. Faxon, The Stalk-eyed Crustacea ("Albatross"). Cambridge 1895, p. 137, Plate XXXVII.)

d_2 Anterior moiety of the fourth carapacial crest entire behind the terminal spine.

e_1 Rostrum with three pairs of lateral spines.

Hepatic spine long, slender, trending strongly outward. Carapace and abdomen sparsely tuberculated . . . . . *loricata* Faxon

(W. Faxon, l. c. p. 140, Plate XXXVIII*bis*.)

e_2 Rostrum with two pairs of lateral spines.

1) This key, but especially that of the species of the subgenus *Plastocrangon*, is partly taken from J. Wood-Mason's paper, in: Annals Mag. Nat. Hist., Febr. 1891 and from A. Alcock's work "A descriptive Catalogue Indian Deep-Sea Crustacea, Calcutta 1901.

Hepatic spine neither very long, nor slender and not trending strongly outward. Carapace and abdomen densely tuberculated — *regalis* Bate

Investigatoris W.-Mas.

(A. ALCOCK, l. c. p. 127). — *Investigatoris* var. *andamanensis* W.-Mas.

b_2 Anterior moiety of the fourth or lateral crest of the carapace undivided and terminating anteriorly in a single small spine.

c_1 Anterior moiety of the 3rd carapacial crest present and ending in the orbital spine.

d_1 Posterior moieties of the 3rd and 4th carapacial crests running parallel with the upper border of the carapace. Abdominal carinae distinct, also on the anterior terga.

e_1 Posterior moiety of subdorsal crest smooth and entire. Branchial region smooth between the 2nd, 3rd and 4th crests . . . — *hastacauda* Bate

e_2 Posterior moiety of subdorsal crest divided into 4 or 5 low, obtuse tubercles. Branchial region granulate between the 2nd, 3rd and 4th crests. . . . . — *pugnax* de Man

d_2 Posterior moieties of the 3rd and 4th carapacial crests directed obliquely downward, not running parallel with the upper border of the carapace. Abdominal terga nearly smooth, the dorsal median carina reduced to very slight elevations . . — *acuminata* Bate [1])

(C. SPENCE BATE, Report Challenger Macrura, 1888, p. 522, Pl. XCIV, figs. 2, 3).

c_2 Anterior moiety of the 3rd carapacial crest, when present, never ending in the orbital spine.

d_1 Posterior moiety of the 2nd or subdorsal crest tuberculate.

e_1 Tubercles of the abdomen numerous. Upper surface of the rostrum smooth, not corrugated.

f_1 Tubercles of the 1st or dorsal crest rather prominent, sharp. Telson much longer than uropods . . . . . — *nobilis* A. M.-Edw.

(A. MILNE-EDWARDS, l. c. 1881, p. 5 and l. c. 1883, Plate 39.)

f_2 Tubercles of the 1th or dorsal crest low and obtuse, mostly longer than broad. Telson little longer than uropods . . — *assimilis* de Man

e_2 Tubercles of the abdomen few in number, obtuse, punctate. Upper surface of the rostrum corrugated . . . . . — *longirostris* (S. I. Smith)

(S. I. SMITH, Bull. Mus. Comp. Zool. X, p. 51, pl. 5, fig. 1, pl. 6, fig. 1, 1882.)

d_2 Posterior moiety of the 2nd or subdorsal crest smooth.

e_1 The 3rd or dorso-lateral crest of the carapace is present behind the cervical groove only . . . . . — *unguiculata* W.-Mas.

(J. WOOD-MASON, Annals Mag. Nat. Hist. for February 1891, p. 193.)

1) The characters of this species are partly taken from the figures in BATE's work.

c_2 The anterior half of the 3rd or dorso-lateral crest is present and ends in a small spine behind and distinct from the orbital spine . . . . . *Gilesii* W.-Mas.

(J. Wood-Mason, l. c. Febr. 1891, p. 193).

b_3 Anterior moiety of the fourth or lateral crest of the carapace divided into two parts, the anterior of which never approaches the level of the orbital margin.

c_1 Posterior pair of peraeopoda terminating in a thick cylindrical dactylus that abruptly ends in two small points.

For the rest much like *Glyph. granulosis* Bate, but less tuberculated. . . . . *podager* Bate

(C. Spence Bate, l. c., p. 516, Pl. XCIII, fig. 2.)

c_2 Posterior pair of peraeopoda terminating in a bifid or cleft extremity.

For the rest much like *Glyph. granulosis* Bate, but with three teeth on each side of the rostrum . . . . . *rimapes* Bate

(C. Spence Bate, l. c., p. 523, Pl. XCIV, fig. 4.)

c_3 Posterior pair of peraeopoda terminating in a dactylus which is vertically compressed, dorsally grooved and lanceolate.

d_1 Margins of the rostrum armed with several (6 or 7) vertically flattened spinous teeth.

Orbital spine armed with a variable number of spinules. Carapace densely strewn with spinules . . . . . *spinulosa* Faxon

(W. Faxon, l. c., 1895, p. 138, Pl. XXXVIII.)

d_2 Margins of the rostrum armed with two pairs of spines.

e_1 The two parts into which the anterior moiety of the 4th or lateral crest is divided, are either both produced into moderate spines or this is at least the case in the anterior part.

f_1 Anterior tooth of the anterior moiety of the subdorsal carapacial crest very large, much larger than the posterior rostral spines, vertically compressed and acute.

g_1 Pleuron of 5th abdominal somite ending in two spines.

h_1 Tubercles of carapace very numerous.

Posterior moiety of 3rd or dorso-lateral crest terminating anteriorly in a strong blunt or subacute cusp. . . . *granulosis* Bate

h_2 Tubercles between the crests of the carapace less numerous, being little more than scattered granules . . . . . *prionota* W.-Mas.

(A. Alcock, l. c., 1901, p. 129.)

g_2 Pleuron of 5th abdominal somite ending in three spines.

Posterior moiety of 3rd or dorso-lateral crest armed in front with a small bidentate tooth, directed laterally. . . . *sculpta* (S. I. Smith)

(S. I. Smith, l. c., 1882, p. 49, Pl. V, fig. 3, Pl. VI, figs. 3—3*d*).

f_2 Anterior tooth or tubercle of the anterior moiety of the subdorsal carapacial crest not very large, not much larger than the posterior rostral spines.

g_1 Posterior moiety of 3rd or dorso-lateral crest ending anteriorly in a sharp spine or tooth.

The two parts into which the anterior moiety of the 4th or lateral crest is divided, are both produced into acute spines *spinicauda* A. M.-Edw.

(A. MILNE-EDWARDS, l. c., 1881, p. 3 and l. c., 1883, Plate 39, figs. 1, 1*a*.)

g_2 Posterior moiety of 3rd or dorso-lateral crest obtuse anteriorly.

h_1 Distance of the anterior tubercle of the 2nd or subdorsal crest from its fellow about twice as long as the distance, measured in the middle line, between the line uniting these two tubercles and the line uniting the two rostral spines of the posterior pair. . . . . *Sibogae* de Man

h_2 Distance of the anterior tubercle of the 2nd or subdorsal crest from its fellow about three times as long as the distance, measured in the middle line, between the line uniting these two tubercles and the line uniting the two rostral spines of the posterior pair.

Of the two parts into which the anterior moiety of the 4th or lateral crest is divided, the part in front of the notch is produced anteriorly to form a spine, while the part behind the notch merely forms a projecting angle or shoulder.

i_1 Upper surface of the rostrum transversely corrugated.

Tubercles of the dorsal and subdorsal crests of the carapace very prominent and spiniform . . . . . *vicaria* Faxon

(W. FAXON, in: Bull. Mus. Comp. Zool. at Harvard College, Vol. XXX, N° 3, Cambridge, Mass., 1896, p. 159, footnote.)

i_2 Upper surface of the rostrum not transversely corrugated.

Tubercles of the dorsal and subdorsal crests of the carapace not very prominent nor spiniform . . . . *megalophthalma* de Man

e_2 Anterior moiety of the 4th or lateral crest broken into two tubercles, the posterior of which is the more prominent . *sicaria* Faxon

(W. FAXON, l. c., 1895, p. 144, Pl. XXXIX.)

a_2 Anterior moiety of the 4th or lateral crest of the carapace continuous with the branchiostegal spine, undivided.

Anterior moiety of the 3rd or dorso-lateral crest of the carapace continuous with the orbital spine. . . . . *neglecta* Faxon

(W. FAXON, l. c., 1896, p. 159, Pl. 1, figs. 5, 6.)

Key to the Species of the Subgenus *Plastocrangon* Alc., hitherto known.

a_1 The anterior half of the 4th or lateral crest of the carapace ends in a huge, vertically compressed, wing-like spine, lying behind and outside the branchiostegal spine, and projecting far beyond the anterior border of the carapace.

b_1 The anterior half of the 4th or lateral crest of the carapace has no spine but the large spine aforesaid: posterior half of 3rd or dorso-lateral crest entire . . . . . *caeca* W.-Mas.

b_2 The anterior half of the 4th or lateral crest of the carapace is cut into two portions, of which the anterior is the large spine aforesaid: posterior half of 3rd or dorso-lateral crest cut into two lobes . . . . . *cerea* Alcock & Anderson

(A. Alcock, l. c., 1901, p. 136.)

a_2 The anterior half of the 4th or lateral crest of the carapace is cut into two small teeth, of which the anterior falls far short of the anterior border of the carapace.

b_1 Rostrum armed on either margin with three spines. Carapace and abdomen crisply tubercled . . . . . *caecescens* W.-Mas.

(A. Alcock, l. c., 1901, p. 133.)

b_2 Rostrum armed on each margin with two spines. Carapace and abdomen not crisply tubercled.

Branchiostegal spine directed straight, horizontally, forward, twice as long as the orbital spine . . . . . *Faxoni* de Man

1. *Glyphocrangon regalis* Bate. Pl. XVIII, Fig. 54—54*k*.

Glyphocrangon regalis C. Spence Bate, Report Challenger Macrura, 1888, p. 517, Pl. XCIII, fig. 3, 4.

? *Glyphocrangon investigatoris* J. Wood-Mason, in: Ann. Mag. Nat. Hist. Febr. 1891, p. 191; and variety *andamanensis* J. Wood-Mason, ibidem, Nov. 1891, p. 356.

? *Glyphocrangon investigatoris* A. Alcock, A descript. Catal. Indian Deep-Sea Crustacea, Calcutta 1901, p. 127.

? Illustrations of the Zoology of the Investigator, Crustacea, Pl. VI, figs. 3, 2.

Stat. 38. April 1. 7° 35′.4 S., 117° 28′.6 E. Paternoster-islands. 521 m. Bottom coral. 1 adult egg-bearing and 1 young female.

Stat. 45. April 6. 7° 24′ S., 118° 15′.2 E. North of Sumbawa. 794 m. Bottom fine grey mud, with some radiolariae and diatomes. 1 young specimen.

Stat. 74. June 8. 5° 3′.5 S., 119° 0′ E. Off Makassar. 450 m. Bottom Globigerina ooze. 1 male of medium size and 1 full-grown female with eggs.

These specimens certainly belong to *Glyph. regalis* Bate, of which the type was taken off Banda Island at a depth of 200 fathoms. According to Spence Bate (l. c. p. 518) the branchial region should be free from tuberculations, in the present specimens, however, it is distinctly granular, except in the two young individuals. One observes, indeed, between the

posterior half of the 3rd or dorso-lateral crest and the posterior half of the 4th or lateral several granules, some of which in the middle show a tendency to fall into a line parallel with these crests; in the same manner the granules that occur below the posterior half of the lateral crest, are also partly arranged in a more or less distinct longitudinal line. For the rest in BATE's figures 3 and 4 (l. c.) some granules are observed on the branchial region between the sub-dorsal and dorso-lateral crests. All the specimens are covered everywhere between the ridges, tubercles and granules with a close tomentum, which is not described by BATE, but for the rest they fully agree with this author's description.

In the adult specimens the large orbital and branchiostegal spines are of equal length and the former is strongly curved inward; in the young female from Stat. 38 the orbital spine is less strongly curved and decidedly shorter than the branchiostegal spine. The posterior moiety of the dorso-lateral crest shows in the two adult females a trace of a tubercle, situated just behind the middle, but in the young female from Stat. 38 it is more distinct; at the posterior extremity of this crest one observes in the adult female from Stat. 74 another more conspicuous tubercle, in the adult female from Stat. 38 this tubercle is not developed, but in the young female from this Station it is distinct, in the male, finally, from Stat. 74 the posterior half of the 3rd crest appears along its whole length smooth and entire. The posterior half of the 4th or lateral crest presents in all the specimens quite posteriorly traces of two tubercles behind one another, for the rest this crest, like the 3rd, appears smooth to the naked eye, though slightly rugose or "worm-eaten", when looked at under the lens. In the young female from Stat. 38 the posterior half of the dorso-lateral crest ends anteriorly in an obtuse angle, but in the other specimens this tooth-like angle does not exist. The transverse furrow at the base of the rostrum is conspicuous and deep. Hepatic region distinctly granulate.

Like the carapace, also the abdomen appears much tubercular and granulate. The pleuron of the 2nd abdominal somite terminates inferiorly in two acute spines, which in the adult females are of equal length, but the anterior is slightly broader than the posterior; in the male and in the young female the anterior is a little longer and larger than the other; just above the anterior spine the margin shows a small rounded prominence. In the two following pleura the recurved anterior spine is a little longer than the posterior, in the pleuron of the 5th somite the posterior spine appears distinctly longer than the anterior and both are recurved, while in the two preceding pleura the posterior spine is straight, not recurved. In all the specimens the four edges of the telson are finely serrate along the widened anterior third.

The eyes of the two adult females are (in spirit) slate-coloured, those of the young female from Stat. 38 are still brick-coloured, while in the male of medium size they are partly slate-, partly brick-coloured.

In the adult female and in the male from Stat. 74 the antennular peduncle is as long as the antennal scale, in the adult female from Stat. 38 it reaches by one-third the terminal joint and in the young female almost by the whole terminal joint beyond it. As usual the outer flagellum appears in the male much broader than in the female.

As results from BATE's figure 3 the antennal scale appears somewhat angular at its anterior extremity, not regularly rounded, and the present specimens agree with that figure,

except in the adult female from Stat. 74, in which the antennal scale (Fig. 54*a*) is more rounded distally; in this female the scale is 12 mm. long and 8 mm. broad, just one and a half as long as broad, while in the other specimens it is a little less broad, these numbers being in the adult female from Stat. 38 11,3 mm. and 6,7 mm., in the male from Stat. 74 8,5 mm. and 5 mm., in the young female (Fig. 54*b*) from Stat. 38, finally, 5,3 mm. and 3 mm.

The external maxillipeds reach to the tip of the antennal scale, while the legs of the 1st pair, with the dactylus extended, reach to or just beyond the distal end of the penultimate joint of the former; the peraeopods of the 2nd pair project by the chela and the three distal joints of the carpus beyond the tip of the antennal scale, those of the 3rd pair reach the tip of the scale, while the 4th and the 5th pair regularly decrease in length, the 5th reaching as far as the 1st. The propodi of the 4th and 5th pair (Fig. 54*e*, 54*f*) end in a brush of setae and their dactylus (Fig. 54*j*, 54*k*) is vertically compressed, lanceolate and grooved along its whole length; the propodus (Fig. 54*d*) of the 3rd pair has no brush of setae and the dactylus (Fig. 54*h*, 54*i*) is less distinctly grooved. According to Spence Bate the dactylus of the 3rd and 4th pair should be cylindrical, pointed, that of the 5th laterally compressed and lanceolate.

Eggs few in number, large, 3,5 mm. long.

In the adult female from Stat. 74 carapace and rostrum, taken together, measure 47 mm., the abdomen from the tip of the median tooth on 1st somite to tip of telson 66 mm., entire length 113 mm., measured in the middle line; in the male from the same Station these numbers are in the same succession 36 mm., 46 mm. and 82 mm.

The young specimen from Stat. 45 is 30,5 mm. long, the carapace with rostrum measuring 14,5 mm., the abdomen 16 mm. It closely resembles the young female from Stat. 38 which is 52 mm. long (carapace + rostrum 23,5 mm., abdomen 28,5 mm.), but, while in this female already some granules are observed between the crests and ridges of carapace and abdomen, in this specimen from Stat. 45 they are still nearly all wanting, for there are only traces of 3 or 4 granules between the posterior moieties of the dorsal and subdorsal crests of the carapace. The rostrum reaches still by almost half its length beyond the antennal scale. Orbital spine directed obliquely upward and slightly outward, branchiostegal spine hardly longer. Posterior half of subdorsal crest divided by three notches into four tubercles, of which the foremost but one is larger or longer than the rest. Posterior moiety of dorso-lateral crest notched nearly in the middle, distal extremity angular, tooth-like, while the two tubercles near the posterior extremity of the lateral crest are still rudimentary. Eyes still straw-coloured. The antennal scale bears a small spinule a little b e f o r e the middle of its outer margin, in the young female from Stat. 38 this spinule still occurs, though already a little b e h i n d the middle, but in the other larger specimens it exists no more, the outer margin appearing only more or less angular at the level of the posterior fifth.

Glyphocrangon Investigatoris W.-Mas. from the Bay of Bengal, the Andaman and the Arabian Seas should in my opinion be regarded as identical with this species. Alcock's description of 1901 accords perfectly well with the specimens collected by the "Siboga"; in fig. 3, Plate VI, of the "Illustrations" the posterior half of the 3rd or dorso-lateral and that of the 4th or lateral crests of the carapace appear to be dentate, which fact was already described

by Wood-Mason in February 1891, but in fig. 2 of the same Plate, representing the variety *andamanensis*, these ridges agree with our specimens. I would finally remark that neither Spence Bate, nor Wood-Mason or Alcock have made mention of the fine close tomentum, with which the body is covered.

General distribution: Off Matuku, Fiji Islands (Bate); north of the Kermadec Islands (Bate); off Banda Island (Bate); Andaman Sea (Alcock); Bay of Bengal (Alcock); Arabian Sea (Alcock).

2. *Glyphocrangon regalis* Bate, var.? Pl. XVIII, Fig. 55—55*b*.

Glyphocrangon regalis C. Spence Bate, Report Challenger Macrura, 1888, p. 517, Pl. XCIII, fig. 3, 4.

Stat. 85. June 17. 0° 36′.5 S., 119° 29′.5 E. Strait of Makassar. 724 m. Bottom fine, grey mud. 1 young female.

This specimen not fully agrees with those referred to *Glyph. regalis* Bate and should perhaps be regarded as a variety. Carapace and rostrum, taken together, are 33 mm. long, the abdomen 43 mm., entire length 76 mm., while the rostrum that extends by one-fourth its length beyond the antennal scale, measures 13 mm. This specimen is thus little smaller than the male of *Glyph. regalis* Bate from Stat. 74. It differs from the specimens, referred to *Glyph. regalis*, by the complete absence of the fine close tomentum, with which the body of these specimens is everywhere covered, the body being quite naked and glabrous. Though the number and arrangement of the crests, ridges and tubercles on carapace and abdomen are exactly the same, they are much more prominent and more conspicuous both on carapace and abdomen. The posterior moiety of the subdorsal crest is broken up into four laterally compressed, truncate tubercles, of which the 2nd or anterior but one is a little longer than the 1st or anterior and than the 3rd, but nearly as long as the 4th, while the 1st is a little longer than the 3rd. The posterior moiety both of the dorso-lateral and of the lateral crest ends anteriorly in an angle, which on the former is rectangular, on the latter more obtuse; the posterior half of the dorso-lateral crest shows a tubercle just behind the middle and another at the posterior end and these tubercles are quite distinct and as well-developed as the three on the posterior half of the posterior moiety of the 4th or lateral crest. One observes between the posterior moieties of the 3rd and 4th crest only one longitudinal line of granules, while in the male from Stat. 74 still other granules are observed, close to the carinae.

The telson extends by one-fourth its length beyond the uropods, when directed straight backward, and the serrulations on the four edges are likewise more prominent.

The vertically compressed spine, to which the anterior half of the 4th or lateral crest is produced, is comparatively larger, reaching forward to the level of the middle of the eyes and nearly as far forward as the orbital spine; it is directed more obliquely outward and much more acuminate. The orbital spine is only half as long as the branchiostegal and directed obliquely upward, though not inward.

In front of the anterior pair of spines the upper surface of the rostrum appears transversely

rugose on either side of the median carina, but these rugosities exist also in the typical specimens, where they are concealed by the tomentum.

Eyes (in spirit) of a drab colour.

Antennular peduncle reaching by one-third the terminal joint beyond the antennal scale. Antennal scale (Fig. 55*a*) like in the adult female from Stat. 74, though still more regularly rounded at the tip, 8 mm. long and 5 mm. broad.

When the three posterior legs are compared with those of the male and adult female from Stat. 74 or with those of the adult female from Stat. 38, the carpus appears shorter in proportion to the merus, and especially with regard to the propodus. So e. g. the merus, carpus and propodus of the 5th leg (Fig. 55*b*) are, in the female from Stat. 85, respectively 10,3 mm., 4,3 mm. and 7 mm. long, in the male from Stat. 74, however, 10,5 mm., 5 mm. and 6,25 mm., in the adult female from the same Station 13,5 mm., 6,5 mm. and 7,75 mm. [1]); probably this difference should, however, be attributed to the younger age of the female from Stat. 85, because the same difference exists in the young female from Stat. 38 and in the very young specimen from Stat. 45: in the young female from Stat. 38 these numbers are namely 6,5 mm., 2,3 mm. and 4 mm., in the specimen from Stat. 45 3,8 mm., 1,1 mm. and 2,72 mm.

3. *Glyphocrangon hastacauda* Bate.

Glyphocrangon hastacauda C. Spence Bate, Report Challenger Macrura, 1888, p. 519, Pl. XCIII, fig. 5.

Glyphocrangon hastacauda A. Alcock, A descript. Catal. Indian Deep-Sea Crustacea, Calcutta, 1901, p. 131.

Stat. 45. April 6. 7° 24′ S., 118° 15′.2 E. North off Sumbawa. 794 m. Bottom fine grey mud, with some radiolariae and diatomes. 1 full-grown egg-laden and 2 young females.

Stat. 161. Aug. 17. 1° 10′.5 S., 130° 9′ E. East of Kofiau-island. 798 m. Bottom muddy sand. 2 adult males.

Stat. 314. Febr. 17, 1900. 7° 36′ S., 117° 30′.8 E. North of Sumbawa. 694 m. Bottom fine, sandy mud. 18 male and 32 female specimens, among which one full-grown ova-bearing female, while the rest are nearly all of medium size and young.

In the larger male from Stat. 161 carapace and rostrum, taken together, are 40 mm. long, the abdomen 54 mm., entire length 94 mm., while the largest specimen, obtained by the "Challenger", measured 82 mm. and that, which was described by Col. Alcock, 75 mm.; the rostrum, 18,5 mm. long, is more than three-fourths the length of the rest of the carapace. In the ova-bearing female from Stat. 314 the carapace, rostrum included, is also 40 mm. long, the abdomen 55 mm., entire length 95 mm.; rostrum also 18,5 mm. long. Unfortunately in the ova-bearing female from Stat. 45 the rostrum has an abnormal form and is evidently regenerated, the carapace without the rostrum is 25,5 mm. long, the abdomen 61 mm.; taking for the rostrum the same relative length with regard to the carapace as in the preceding specimens, it has originally been 22 mm. long, so that the entire length of this female may be fixed on 108 mm.

The anterior half of the subdorsal crest and the posterior portion of the 3rd and 4th

1) In the figure 54*g* on Plate XVIII, representing the leg of the 5th pair of the adult female of *Glyph. regalis* from Stat. 74, the carpus has been figured two-thirds of a millimeter too long.

carinae end in this species in a small spinule, in adult specimens, however, one or more of these spinules are often worn off. Sometimes 3 or 4 small tubercles or granules are observed just below the posterior moiety of the 4th or lateral carina, posteriorly, though they are often wanting at all. Usually the two dorsal crests converge regularly backward, but sometimes the gastric portions run nearly parallel. The dorsal crests are usually finely serrulate or crenulate, but sometimes the gastric portion of these carinae appears more or less smooth.

This species is easily distinguished by the anterior portion of the 3rd or dorso-lateral carina or post-antennal crest that extends from the orbital spine backward to the cervical groove; sometimes in young specimens this crest can only be traced to midway between the orbital margin and the cervical groove and such specimens in this case closely resemble *Glyph. unguiculata* W.-Mas., which is the nearest allied form and perhaps identical with *Glyph. acuminata* Bate, that was obtained by the "Challenger" near the Fiji Islands.

The eyes of the young specimens from Stat. 314 show the same dark slate colour (in spirit) as those of the adult, excepting one specimen long 34 mm., in which they are of a light leather colour.

Eggs almost globular, 3 mm. broad.

General distribution: Off Japan (Bate); Bay of Bengal, off Ceylon (Alcock).

4. *Glyphocrangon pugnax* de Man. Pl. XVIII and XIX, Fig. 56—56*c*.

Glyphocrangon pugnax J. G. de Man, in: "Tijdschr. d. Ned. Dierk. Vereen." (2) Dl. XVI. Afl. 2 and 3, 1918, p. 293.

Stat. 297. January 27, 1900. 10° 39′ S., 123° 40′ E. Between the island of Rotti and Timor. 520 m. Bottom soft, grey mud with brown upper layer. 2 females without eggs, of equal size.

A new species closely related to *Glyph. hastacauda* Bate, *acuminata* Bate and *nobilis* A. M.-Edw.

In its outer appearance *Glyph. pugnax* resembles *Glyph. hastacauda* Bate. Rostrum little shorter than carapace and reaching by two-fifths its length beyond the antennal scale; it appears a little less broad in proportion to its length than the rostrum of *Glyph. hastacauda*, because, while in the latter the rostrum is three times as long as the distance between the two posterior teeth that are situated above the orbital margin, in this new species it is four times that distance. Like in *Glyph. hastacauda* the spines of the anterior pair are a little larger and more pointed than those of the posterior, but the anterior pair is implanted distinctly in front of the eyes, just behind the distal extremity of basal antennular article, while in *Glyph. hastacauda* the spines of the anterior pair reach not or hardly beyond the eyes; the lateral margins of the rostrum run in *Glyph. pugnax*, between the two pairs of spines, straight backward and are therefore parallel, but in *Glyph. hastacauda* the lateral margins are here distinctly concave. In both species the two pairs of rostral teeth are rather small. The median ridge, which, like in *Glyph. hastacauda*, is slightly elevated above the lateral margins in front of the anterior pair of spines, ends in a small subacute tubercle near the transverse basal groove that separates the rostrum from the gastric region,

in *Glyph. hastacauda* this small tubercle does not exist. In both species the distal third is curved upward and the lower border grooved, with a median ridge anteriorly.

The orbital spines that are directed obliquely upward, run straight forward, when the carapace is looked at from above, as far forward as the eyes; in *Glyph. hastacauda* they reach not so far forward and are distinctly turned outward. Branchiostegal spine directed straight forward, as long as the orbital spine, by which it is wholly concealed, when the carapace is looked at from above.

Dorsal crests almost parallel, converging but very slightly backward, anterior portion divided into 6 or 7, posterior into 4 or 5, low obtuse tubercles; quite anteriorly at the inner side of each dorsal crest there is a small subacute tubercle and, like in other species, between them and a little more forward, a similar tubercle exists in the middle line near the transverse furrow; behind this median tubercle 3 or 4 still smaller ones occur in the middle line. Between the two dorsal crests the gastric region bears at either side a longitudinal row of 5 or 6 very small granules and, immediately behind the cervical groove, between the anterior pair of tubercles of the posterior portion, one observes at either side of the middle a similar small granule. The anterior portion of the subdorsal crest is broken up into 4 tubercles; the anterior, larger than the others and acute, is situated at the continuation of the lateral margins of the rostrum, like in other species, and should more rightly be described as a third rostral tooth; this tooth is separated, like in *Glyph. assimilis* and other species, by a longer interval from the 2nd than the following from one another. The 3 following decrease in size backward, the 2nd is also acute and sharp, the two posterior obtuse. Posterior portion of 2nd crest divided into 4 or 5 low obtuse tubercles, of which the 2nd is a little longer than the rest; in one female there are on the left side but 3 tubercles, of which the middle one is as long as the 2nd and 3rd of the right side. Between the dorsal and subdorsal crests are situated several obtuse or subacute granules of unequal size, on the gastric region just outside the dorsal crest a longitudinal row of 9 or 10 small granules and 8 or 9 larger ones more laterally. Posterior division of 3rd or dorso-lateral crest smooth with obtuse anterior extremity, between the latter and the anterior tooth of the subdorsal crest are situated 3 or 4 subacute small tubercles on the upper border of the groove that separates the hepatic from the gastric region, like in *Glyph. assimilis*. Between the posterior portion of the 2nd and 3rd carinae are situated 9 or 10 small granules in a longitudinal line. The anterior portion is formed, like in *Glyph. hastacauda*, by a smooth crest that runs from the orbital spine backward to near the cervical groove and there are one or two granules between this groove and the posterior extremity of the crest. In one specimen 2 small granules are observed, a little behind the orbital margin, at each side of the rostrum, on the orbital region and a third granule exists quite posteriorly, near the groove separating the hepatic from the gastric region; one observes in the other female on the hepatic area posteriorly 3 or 4 granules, but no granules anteriorly. Fourth or lateral carina as in *Glyph. hastacauda*, posterior portion subacute distally, anterior terminating in a sharp tooth; the 4th carina and the posterior portion of the 3rd prove to run parallel with one another and with the upper border of the carapace, in a lateral view of the latter. There is a longitudinal row of 10 or 11 small granules midway between the posterior portion of the 3rd and 4th carinae

on the branchial region and a few granules occur just below the posterior portion of the lateral crest.

The abdomen seems not to differ from that of *Glyph. hastacauda*, the small crests and tubercles on the somites are a little more distinct and prominent. Telson a little longer than the uropods, the extreme tip slightly upturned; edges salient, smooth.

Eyes of a pale chestnut colour, their greater diameter measures one-ninth the length of the carapace, rostrum included; on the peduncle is a small tubercle, anteriorly, near the cornea.

The antennular peduncle reaches by half the terminal joint beyond the tip of the antennal scale and resembles, like also the flagella, that of the female of *Glyph. hastacauda*. The antennal scale (Fig. 56*c*) is comparatively a little less broad than in this species, its outer margin unarmed.

The legs also do not seem to differ.

Length 82 mm. (rostrum 17 mm., carapace 19 mm., abdomen 46 mm.), all measured in the middle line.

Glyph. acuminata Bate from the Fiji Islands is a related form. According to the diagnosis, preceding the measurements (Report Challenger Macrura, p. 522), the carapace should be smooth, excepting the dorsal carinae that are slightly tuberculated, in the additional remarks, however, we read: "the carapace is smooth, excepting the dorsal carinae, which are slightly tuberculated, as well as the outer or second carina"! In Fig. 3♀ the second carina, however, is hardly indicated and does not seem to be tuberculated. In both figures 2♂ and 3♀ the posterior moieties of the 3rd and 4th carinae run not parallel with the upper border of the carapace, different from *Glyph. pugnax*, the abdominal terga, finally, are apparently smooth and the median carina less prominent.

Glyph. nobilis A. M.-Edw. from St. Domingo, finally, is no doubt also different, the orbital spines being distinctly turned outward, the tubercles of the dorsal and subdorsal carinae are spiniform, with acute tips directed upward, the telson, finally, is much longer than the uropods, all characters taken from the figures 2 and 2*a* of Plate 39 of the "Recueil de Figures de Crustacés nouveaux ou peu connus", published by A. Milne-Edwards in April 1883.

5. *Glyphocrangon assimilis* de Man. Pl. XIX, Fig. 57—57*h*.

Glyphocrangon assimilis J. G. de Man, in: Tijdschr. d. Ned. Dierk. Vereen. (2) Dl. XVI, Afl. 2 and 3, 1918, p. 294.

Stat. 316. Febr. 19, 1900. 7° 19'.4 S., 116° 49'.5 E. Bali Sea. 538 m. Bottom fine, dark brown sandy mud. 2 males and 3 females, one of which is ova-bearing.

A new species of small size, the nearest allied forms of which are *Glyph. nobilis* A. M.-Edw., *longirostris* (S. I. Smith) and *Gilesii* W.-Mas. In the larger male the rostrum measures just six-sevenths, in the ova-bearing female, that is of a somewhat larger size, just three-fourths the length of the rest of the carapace, measured in the middle line; in the younger specimens the rostrum is comparatively longer, so e. g. in the largest female but one carapace and rostrum measure respectively 14,2 mm. and 12,5 mm., while in the younger male the numbers are 12,5 mm. and 11,5 mm. In the male (Fig. 57*h*) the rostrum extends with almost half its length

beyond the tip of the antennal scale, in the female (Fig. 57, 57*a*, 57*b*) only with one-third or one-fourth. The proximal two-thirds are horizontal, the distal third curved upward; it is armed on each side with 2 spines, the anterior reaching just beyond the eye, more pointed and a little larger than the posterior, which is situated at the level of the orbital margin; the median ridge, which on the distal upturned part is elevated above the lateral margins, appears on the rest of the rostrum as a delicate thread-like line, traceable almost as far as the transverse groove at the base, and on each side of it the rostrum is not corrugated. The lower border is grooved, the groove widens on the distal upturned part and is furnished here with a median ridge.

Orbital spine directed a little outward, like in *Glyph. Gilesii*, and a little larger than the branchiostegal spine, which is almost entirely concealed by the former, when the carapace is looked at from above. The dorsal crests run parallel, the anterior portion of either crest in front of the cervical groove is divided into 6 or 7 low, obtuse and contiguous tubercles that are longer than thick; just inside the anterior tubercle is placed a very small, subacute tooth and a similar small tooth exists, just in front of these two small denticles, in the middle line, immediately behind the basal groove of the rostrum; the posterior portion of the dorsal carinae is formed by 3, rarely 4 or 5, tubercles similar to those of the anterior part. Between the two dorsal crests the surface is smooth. The anterior portion of the 2nd or subdorsal crest is broken into 4 tubercles, of which the subacute 1st or anterior, separated from the 2nd by a deeper and longer notch than the others and situated at the posterior extremity of the lateral margins of the rostrum, should in my opinion more rightly be considered as a third rostral tooth. This tooth, a little larger than the posterior rostral tooth, is also somewhat larger than the three other teeth, that resemble those of the dorsal carinae; the two anterior are subequal and a little longer than the posterior one. The posterior portion of the subdorsal carinae is formed by 3, 4 or 5 low, obtuse and contiguous tubercles that resemble those of the dorsal crests; they are of unequal length. Between the dorsal and subdorsal carinae one observes both on the gastric and the cardiac region a few small, obtuse granules, so e. g. in the ova-bearing female 4 on the gastric, 4 on the cardiac region; the position of these granules is much variable. The posterior moiety of the 3rd or dorso-lateral crest is smooth and does not end anteriorly in a tooth, in the ova-bearing and in a younger female, however, there is a trace of a notch a little behind the middle; in front of the anterior extremity there is still a row of 2 or 3 small subacute or obtuse tubercles, placed obliquely on the upper border of the groove, that separates the hepatic from the gastric area. This species now belongs to those in which the anterior portion of the 3rd crest is developed. This anterior portion ends anteriorly, like in *Glyph. Gilesii*, in a small sharp tooth or spine lying immediately behind the pre-eminently large, orbital spine, but, while in *Glyph. Gilesii* the crest runs backward to the cervical groove (Illustr. Zool. Investigator, Pl. VII, fig. 4), in *Glyph. assimilis* it is less completely developed. In the younger male, long 53 or 54 mm., the crest reaches from the anterior extremity backward to midway between it and the cervical groove, then follows immediately a small granule and a little more backward another; in the larger male the crest measures but one-third the distance between the anterior extremity and the cervical groove, it is followed immediately by a very small granule and near the cervical groove by a somewhat larger, sharp

one, while one observes on the left side midway between these two still a third microscopical granule, that, however, does not exist on the right side of the carapace. In the ova-bearing female the crest is almost confined to the anterior subacute tooth, while on the right side one small granule occurs immediately behind the tooth, on the left side two and near the cervical groove a third; in the second female, which is about 60 mm. long, the crest is as long as in the younger male and followed on the right side by 3 or 4, on the left by 2 or 3 granules; in the youngest female, finally, the crest reaches on the left side almost to midway between the anterior tooth and the cervical groove, followed close to the latter by a granule, but on the right side it is confined to the rather obtuse anterior tooth, behind which are one or two granules. We conclude from the preceding observations that the development of the anterior portion of the dorso-lateral crest varies rather much individually. Both the anterior and the posterior portion of the 4th or lateral crest are smooth and entire, the former ends in a small sharp tooth, while the anterior extremity of the posterior portion is subacute. All the tubercles and crests of the carapace are coarsely and irregularly punctate, presenting therefore a "worm-eaten" edge.

The abdomen differs at first sight from that of *Glyph. Gilesii* by the median carina of the terga being rather prominent and by the somites being all covered with numerous granules. The median subacute tooth on the 1st tergum extends almost to the posterior margin and its curved upper margin is slightly notched posteriorly; the lateral teeth are as usual a little smaller. The granules are arranged on the terga and pleura nearly like in *Glyph. regalis*, they are mostly circular in outline, of unequal size, and gradually become smaller and less in number towards the lower margin of the pleura, while they appear irregularly punctate and corrugate when examined under a lens. The antero-inferior angle of the pleura of the 2nd somite is rectangular, obtuse, the postero-inferior angle sharp, while the acute middle tooth is larger than the posterior. The 3rd and 4th terminate each in two sharp teeth, of which the anterior is the larger, while of the two teeth at the free end of the 5th pleura the posterior is much larger than the other; the single spine of the 6th pleuron is well-developed. While the granules with which the abdomen is covered, are rather rounded and obtuse on the 1st to 3rd somite, they are acute on the 5th and 6th, with the sharp tip directed backward, and on the 4th somite one observes a tendency to change their form. Telson little longer than the uropods, the extreme tip slightly upturned; all the edges are salient, sharp and slightly serrulate proximally.

Eyes dark-purple (in spirit); the carapace of the ova-bearing female, rostrum included, is 7-times, that of the larger male $7^1/_2$-times as long as the greater diameter of the eyes.

The antennular peduncle extends in the ova-bearing female by two-thirds, in the larger male by the whole terminal joint beyond the antennal scale; the peduncle has a more slender form in the female than in the male, the 2nd and 3rd joint taken together are a little shorter than the basal joint, the 2nd in the male once and a half, in the female twice as long as the 3rd joint; as usual in this genus, the outer flagellum is much broader in the male than in the female.

The antennal scale (Fig. 57*c*) measures in the ova-bearing female about one-fourth ($\frac{1}{3.8}$) the length of the carapace, rostrum included; the scale, that has an elliptical form, is two and one-third times as long as broad, and the outer margin bears a small spinule just behind the

middle. Antennal peduncle slender, a little shorter than the scale. The antennal scale of the male is comparatively a little broader, being almost twice as long as broad, and is slightly shorter in proportion to the carapace, rostrum included, measuring $\frac{1}{4,55}$ their length; the spine on the outer margin is more distinct and the antennal peduncle, nearly as long as that of the inner antennae, reaches a little beyond the scale.

The external maxillipeds are but little shorter than the antennal scale. The legs of the 2nd pair are distinctly shorter than any of the last 3 pairs and reach only to the middle of the antennal scale: the legs of the 3rd and 5th pair extend to the tip of the scale, those of the 4th slightly beyond it. Like in other species, the propodi of the two last pairs (Fig. 57*e*, 57*f*) end in a brush of setae; the dactyli of the 3rd (Fig. 57*d*) and 5th (Fig. 57*f*) pair are almost half as long as their propodi, those of the 4th (Fig. 57*e*) measure two-thirds the latter; the dactyli are lanceolate, pointed, grooved along their whole length in the 4th and 5th pair, only on the distal half in the 3rd.

Eggs few in number, orange or rusty-coloured, longer diameter 2 mm.

Rostrum, carapace and abdomen are in the larger male respectively 12 mm., 14 mm. and 29 mm. long, entire length 55 mm.; in the ova-bearing female these numbers are in the same succession 12 mm., 16 mm., 36 mm. and 64 mm.

The male and female from the Arakan coast, that were referred in March 1905 by Mac Gilchrist with some doubt to *Glyph. longirostris* (S. I. Smith) (in: Annals Mag. Nat. Hist. Ser. 7, Vol. XV, March 1905, p. 238), probably belong to *Glyph. assimilis*, though the tubercles of the abdomen are described as "broad flat low", which is not the case in this species; the eyes were also somewhat smaller, because in the Indian specimens the length of the carapace, including rostrum, measured about $8^1/_2$-times their greater diameter.

Glyph. longirostris (S. I. Smith) differs 1° by its much larger size, 2° by the absence of any trace of the anterior portion of the 3rd or dorso-lateral crest, 3° by the orbital spine being directed much more obliquely outward, 4° by the tubercles on the abdominal terga being larger and fewer in number, while they are apparently wanting on the side-plates of the 2nd—4th somites, 5° by the shorter dactyli of the three posterior legs (confer: S. I. Smith, Report on the Decapod Crustacea of the Albatross Dredgings off the East coast of the United States during the summer and autumn of 1884. Wash. 1886, p. 51, Pl. VIII, figs. 1, 2, Pl. IX, figs. 3, 4, 5).

Glyph. nobilis A. M.-Edw., finally, from the Antilles bears probably traces of the anterior portion of the dorso-lateral carina, for in the short description (in: Annal. Scienc. Nat., Zoologie, Juin 1881, p. 5) A. Milne-Edwards says: "Les proéminences rugueuses de la carapace et de l'abdomen sont beaucoup plus nombreuses, elles existent sur la région hépatique qui est presque lisse chez le *Gl. spinicauda*". This species, however, apparently differs from *Glyph. assimilis* by the tubercles of the dorsal and subdorsal crests of the carapace being spiniform and pointed, furthermore by the telson which is much longer than the uropods and of which the distal half is turned upward. A new description and better figures of this species are, however, indeed necessary.

6. *Glyphocrangon granulosis* Bate. Pl. XIX, Fig. 58—58*f*.

Glyphocrangon granulosis C. Spence Bate, Report Challenger Macrura, 1888, p. 507, Pl. XCII; Pl. XCIII, fig. 1.

? *Glyphocrangon priononota* J. Wood-Mason, Ann. Mag. Nat. Hist., Febr. 1891, p. 192; A. Alcock, A descriptive Catalogue of the Indian Deep-Sea Crustacea, Calcutta 1901, p. 129.
? Illustrations of the Zoology of the Investigator, Crustacea, Pl. VI, fig. 1 and 1*a*.

Stat. 88. June 20. 0° 34'.6 N., 119° 8'.5 E. Northern part of the Strait of Makassar. 1301 m. Bottom fine grey mud. Trawl chiefly brought up yellow mud. One full-grown egg-bearing female.

Carapace and rostrum of this beautiful, well preserved specimen are together 66 mm. long, the abdomen 85 mm., so that this female is 151 mm. long, 30 mm. longer than the specimens obtained by the "Challenger"; the rostrum, 27 mm., measures almost three-fourths the length of the rest of the carapace, the distance between the tips of the foremost teeth of the 4th or lateral carinae measures 31 mm., the distance, finally, between the anterior extremities of the posterior moieties of the 3rd or dorso-lateral crests 30,5 mm. In the "Challenger" type rostrum and carapace together were 49 mm. long, the abdomen 72 mm., so that in the full-grown female from Stat. 88 the abdomen appears a little shorter in proportion to the rest of the body than in the younger Challenger type.

Though this female should in my opinion be referred to BATE's species, it shows some differences both from the description and the figures. The two flattened spines, into which the anterior moiety of the 4th or lateral crest is cut, are less pointed, less acuminate than in Fig. 1 of BATE's Report, while the notch between them is deeper. In that figure the anterior parts of the dorsal ridges of the carapace appear to be formed by 11 or 12 sharp narrow cusps or teeth, while in the female from the Strait of Makassar one observes only 5 or 6 laterally compressed and rather obtuse cusps, like in *Glyph. priononota*; behind the cervical groove the dorsal ridges are formed by 5 or 6 cusps, that decrease in size backward. The rostrum is armed on each side with two spines, the anterior reaching just beyond the eye, the posterior situated just behind it, but there is no third small spine at the base of the rostrum, as described by BATE in his female. The anterior moiety of the 2nd or subdorsal crest is represented by three or four teeth, like in *Glyph. priononota*, of which the anterior is by far the largest and larger than the rostral spines, being almost of the same size as the anterior tooth of the 4th or lateral carina: in BATE's figure, however, one observes behind the large anterior tooth still 5 or 6 smaller ones. The posterior moiety of the subdorsal crest is formed in the female from Stat. 88 by 5 or 6 obtuse and compressed teeth, of which the anterior but one is longer than the rest, in BATE's figure, however, by 8 sharp teeth, that increase in size backwards. The only present posterior moiety of the 3rd or dorso-lateral crest ends anteriorly in a subacute tooth, while its posterior half shows two or three notches, by which three teeth or tubercles are formed, the anterior of which is longer than the posterior. For the rest the carapace is covered, between the carinae, with an equally large number of granules or teeth as in the Challenger type, with a larger number therefore than in *Glyph. priononota*, but these granules are obtuse or subacute and they show, especially on the cardiac and branchial regions, a tendency to fall into lines parallel with the crests. There are 25 or 26 subacute granules of unequal size on the hepatic region and 4 granules are observed on the orbital region between the rostrum and the orbital spine.

The abdomen agrees with BATE's description and figures, but the median tooth on the 1st tergum extends farther backwards and, being notched anteriorly, shows a different form, while of the three acute spines with which the pleura of the 2nd somite are armed, the small anterior one is represented by a small rounded prominence. In a lateral view of the animal the branchiostegal spine appears broader at its base than the orbital, but in BATE's figure 2 one observes the contrary.

Eyes chestnut-coloured.

The antennular peduncle is as long as the antennal scale; the 2nd joint, half as long as the 1st, is twice as long as broad and appears, looked at from above, but little broader distally than at its base, while it is a little broader than thick in the middle; the 3rd joint is half as long as the 2nd. The antennular peduncle fully agrees with that of *Glyph. prionotota*, when seen laterally (Illustrations of the Zoology of the Investigator, Pl. VI, fig. 1*a*), because in Fig. 1 of Plate VI this peduncle has evidently been wrongly figured, the 2nd joint appearing in this figure but slightly longer than the third. In the Challenger specimens the peduncle reached in the female beyond the rostrum and the 3rd joint projected beyond the antennal scale (C. SPENCE BATE, l. c., fig. 1), while the 2nd and the 3rd joint show in this figure a slenderer form than in the female from Stat. 88. The peduncle of this female agrees very well on the contrary with BATE's figure *b*♂, in which the antennular peduncle of the male is figured, so that in my opinion in Fig. 1 the peduncle has been figured much too slender.

The antennal scale (Fig. 58*a*) fully resembles that of the Challenger type (C. SPENCE BATE, l. c., fig. 1 and *c*♀); it is 16 mm. long and 9 mm. broad, the breadth being little more than half its length and it tapers distinctly to the obtuse tip. The outer margin shows at the proximal third a small obtuse prominence, the rest, no doubt, of the lateral spine, as is proved by young specimens of other species, in which this spine still occurs; this prominence was not figured by BATE.

The 2nd pair of legs reach to the tip of the antennal scale and are a little shorter than any of the last three pairs, that all extend beyond the scale; like in other species the propodi of the 4th and 5th pair (Fig. 58*c*, 58*d*) end in a brush of setae, while their dactyli are one and a half as long as those of the 3rd pair (Fig. 58*b*); the latter are only grooved from the tip almost to the middle, but the dactyli of the 4th and 5th legs are broadly grooved along their whole length, with a longitudinal ridge in the middle.

Eggs few in number, large, 4 mm. long.

The spines, tubercles and granules of carapace and abdomen are of a scarlet colour (in spirit), while the appendages are red.

Glyph. prionotota W.-Mas. should probably be regarded as a variety of this species, chiefly characterized by a smaller number of granules etc. between the carinae of the carapace.

Both forms are represented in the West-Indies by the very closely related *Glyph. spinicauda* A. M.-Edw., which was figured by A. MILNE-EDWARDS on Plate 39 of his "Recueil de Figures de Crustacés nouveaux ou peu connus", in April 1883; when this figure is indeed accurate, this species should differ by the small size of the anterior tooth of the subdorsal crest, by the antennal scale being broader and more regularly rounded at the tip, by the shorter propodi of the three posterior legs and perhaps by still other differences.

The name *granulosis* is probably owing to a slip of the pen for *granulosa*.

General distribution: The two type specimens of *Glyph. granulosis* were taken by the "Challenger" between New Guinea and the Admiralty Islands, while *Glyph. prionota* is still only known from the Arabian Sea.

7. *Glyphocrangon Sibogae* de Man. Pl. XIX and XX, Fig. 59—59*c*.

Glyphocrangon Sibogae J. G. de Man, in: "Tijdschr. d. Ned. Dierk. Vereen." (2) Dl. XVI, Afl. 2 and 3, 1918, p. 295.

Stat. 18. March 18. 7° 28'.2 S., 115° 24'.6 E. Bali Sea. 1018 m. Bottom fine grey mud. 1 adult, very mutilated specimen and 1 young female.

Stat. 45. April 6. 7° 24' S., 118° 15'.2 E. Flores Sea. 794 m. Bottom fine grey mud, with some radiolariae and diatomes. 6 females of different size, 2 of which are ovigerous.

A new species related to *Glyph. sicaria* Faxon from the Gulf of Panama and pertaining to that Section of the genus, in which the anterior moiety of the 4th or lateral crest is divided into two parts produced anteriorly into moderate spines, the anterior of which falls far short of the anterior border of the carapace.

The two largest specimens are the egg-laden females; of the larger the carapace, measured in the middle line, is 27 mm., the rostrum 24,3 mm. long, in the other these numbers are for both rostrum and carapace 21,5 mm.; in the third female carapace and rostrum are also both 20 mm. long, in the fourth the carapace 20,5 mm., the rostrum 19,5 mm., in the fifth these numbers are, in the same succession, 15 mm. and 17,75 mm., in the sixth, finally, 12 mm. and 13,5 mm. In the adult specimen from Stat. 18, which has lost all appendages, the carapace is 24 mm. long, the rostrum 23 mm., in the young female these numbers are for the carapace 13 mm., for the rostrum 14 mm. In the full-grown ovigerous specimen the rostrum is thus slightly shorter than the carapace, in those of medium size both are of equal or subequal length and in the smallest individuals the rostrum is distinctly longer than the carapace, as is usually the case. The largest specimen, of which the abdomen is 57 mm. long, has a length of 108 mm., the youngest female is 54 mm. long. Like in other species the rostrum, that reaches by almost half its length beyond the tip of the antennular peduncle, is slightly directed downward for two-thirds its length, the distal third is feebly curved upward, the tip, however, does not reach to the level of the upper border of the carapace. Like in *Glyph. sicaria* the rostrum is armed with two pairs of small spines, those of the anterior pair are acute, situated a little in advance of the eyes and reaching with their tips to the far end of basal antennular article, the spines of the posterior pair are only half as long, subacute and placed immediately in advance of the orbital margin; the distance between the tips of the spines of the posterior pair is just as long as the distance between the line that unites these spines and that which unites the spines of the anterior pair; the margin between the two pairs is slightly concave. The median carina, traceable to the small acute tooth at the anterior boundary of the gastric region, is on the distal upturned part slightly elevated above the lateral margins and on each side of it the rostrum is, in front of the anterior pair of spines, transversely corrugated, though not on the distal upturned part; the flattened or slightly grooved, lower border is on the distal upturned part distinctly carinate in the middle line.

The whole animal is covered with a close velvety tomentum, excepting the ridges and tubercles on carapace and abdomen that are naked.

Orbital spine curved upward and forward, hardly reaching beyond the middle of the eye, branchiostegal spine a little longer, reaching as far forward as the eye, directed slightly outward and almost horizontally forward, while in *Glyph. sicaria* this spine is more strongly turned downward (confer W. Faxon, The Stalk-eyed Crustacea, Cambridge 1895, Pl. XXXIX, fig. 1 *a*).

Anterior moiety of dorsal crest divided into 6 roundish tubercles, that are distinctly separated from one another; they are low, not prominent and appear in a lateral view sometimes subacute, but often also blunt and obtuse; they are of somewhat unequal size, the posterior but one is often a little larger than the others and the posterior the smallest; often the tubercles of the penultimate pair are a little farther distant from one another than the others. The posterior part of the dorsal crest is formed by 3, rarely 4, similar low and rounded tubercles, of which the 1st or anterior is usually distinctly larger than the rest. The dorsal crests of each part run parallel, those of the anterior part farther distant from one another than those behind the cervical groove. Between the two crests the surface bears no granules. The anterior moiety of the subdorsal crest is formed by 5 roundish or slightly transverse tubercles, placed in an arched line, the convexity of which is turned outward; the anterior or 1st, which perhaps should more rightly be considered as a third rostral tooth, is conical, in the largest female subacute, in the rest blunt and is a little more prominent than the others which are low, not prominent, usually obtuse and blunt, rarely subacute in a lateral view. The 1st conical tubercle is as far distant from the posterior rostral spine as the latter from the anterior and, as in other species, the 1st conical tooth is separated by a longer interval from the 2nd than the others from one another; the 3rd tubercle, which is transverse, broader than long, is larger than the 2nd, 4th and 5th, while the 5th is the smallest. At the inner side of the 2nd tubercle and close to it one observes a smaller tubercle and in the largest specimen a still smaller tubercle occurs just outside the 1st of the dorsal row, and these two tubercles are placed obliquely along the lateral parts of the rostro-gastric groove, which is rather deep. The posterior moiety of the subdorsal ridge is divided into 5 or 6 tubercles, that, excepting the last, are longer than broad, the 2nd is the longest and the largest, the 5th or posterior more roundish and the smallest of all; these tubercles are also low, not prominent and blunt. Two or three smaller tubercles occur near the cervical groove between the anterior tubercle of the posterior moiety of the subdorsal ridge and that of the dorsal crest and a few smaller granules exist more posteriorly. Hepatic area somewhat swollen, the oval swelling separated by shallow depressions from the surrounding spines and with one or two more or less distinct, small granules nearly in the middle. The hepatic groove that separates the hepatic area from the rostrum, the gastric and the branchial region, is rather deep. Posterior moiety of 3rd or dorso-lateral crest straight, entire, with rounded, obtuse, anterior extremity. In front of this extremity though more inward a subacute tubercle occurs on the upper border of the hepatic groove. The two teeth or spines into which the anterior moiety of the 4th carina is divided, are both sharp and acute; the anterior which falls far short of the margin between the orbital and the branchiostegal spine,

is half as long as the posterior, the anterior margin of which is only half as long as that of the anterior tooth, so that the latter is more prominent laterally, larger. Posterior moiety of lateral crest straight, entire, with obtuse, blunt, anterior extremity; a small tubercle occurs near the posterior border of the carapace between the posterior extremities of the 3rd and 4th crest, for the rest the branchial region is smooth above the lateral carina. All the tubercles and carinae of the carapace show a corroded and croded appearance.

Abdomen moderately tuberculate and carinate. Median tooth of 1st tergum rounded anteriorly and transversely, shorter than anteriorly broad; lateral teeth smaller, obtuse anteriorly though not rounded; posteriorly the tergum bears at either side 4 tubercles in a transverse row, of which the 1st or submedian, the 3rd and the 4th are small, granuliform, the 2nd twice as large. The pleuron of the 1st somite ends at its antero-inferior angle, in young specimens, in a sharp tooth, which is directed forward, in older individuals the angle becomes obtuse; there are 4 rounded tubercles on the upper half of the pleuron near the anterior margin, of which the 1st or uppermost is the largest, then follows the 3rd, while the 2nd and the 4th are very small. On all the following terga the median crest is distinctly notched and moderately prominent. On the 2nd tergum both parts are subequal in length, rounded above; between the rounded, lateral tubercles on the boundary between tergum and pleuron and the circular anterior of the median crest are situated 6 tubercles, one, the largest and nearly of the same size as the median one, midway between the latter and the lateral tubercle; between this largest and the median tubercle two smaller are situated behind one another and between the largest and the lateral tubercle three, also behind one another, that decrease in size from the anterior to the posterior. Between the oblong posterior tubercle of the median crest and the small lateral at the limit between tergum and pleuron are placed, like on the 1st tergum, 4 tubercles in a transverse row, of which the 2nd is the largest, the three others small and granuliform, but sometimes the 1st and the 2nd are coalesced. The median swelling of the 2nd pleuron bears 4 not very prominent, rounded tubercles that increase in size from the upper to the lower, often are the two middle ones coalesced; 4 or 5 small granules occur between the swelling and the anterior margin, 2 or 3 between the swelling and the posterior border and the pleuron ends in two spines, of which the anterior is twice as long as the posterior, while the antero-inferior angle is obtuse. On the 3rd tergum the posterior part of the median crest is a little longer than the anterior and slightly compressed laterally, the tuberculation resembles for the rest that of the 2nd; the swelling shows 5 rounded tubercles, that increase in size from the upper to the lower, which at the antero-inferior extremity projects slightly like a blunt tooth; 2 or 3 small granules occur sometimes between the swelling and the posterior margin and the pleuron ends in two spines, of which the anterior is one and a half as long as the posterior. On the 4th tergum the posterior part of the median crest is distinctly laterally compressed, $2^1/_2$-times as long as the anterior and its upper border is fluted longitudinally, the anterior part is also slightly compressed; the tuberculation of the anterior moiety of this tergum is nearly the same as in the 2nd and 3rd, three smaller tubercles being situated behind one another near the lateral tubercle that separates the tergum from the pleuron and two behind one another on each side of the median tubercle; on each side of the posterior part of the median crest two tubercles

are observed, of which the inner is hammer-shaped with the handle directed backward and slightly outward; as regards the two lower spines and the tuberculation the pleuron of the 4th somite resembles that of the 3rd, but the obtuse tooth at the end of the swelling is a little more prominent. The median part of the trifurcate crest on the 5th tergum is widely interrupted, the anterior part longer than the posterior and the lateral branches are fluted above; a longitudinal row of 4 tubercles, of which the posterior is elongate, curved and as long as the three anterior together, separates the tergum from the pleuron; on the anterior moiety are on each side 7 tubercles, firstly a larger oblong tubercle near the median crest, then follows a longitudinal row of 4 tubercles and, finally, between this row and the boundary-row of the pleuron still two elongate tubercles behind and close to one another. The pleuron bears 2 tubercles above one another, of which the upper is dentiform, subacute, and of the 2 spines in which it terminates, the posterior is longer than the anterior. On the 6th somite the median crest is compressed laterally, its posterior extremity is sharp and it is divided in two parts, of which the posterior is twice as long as the anterior; the lateral border of the anterior moiety of this tergum is formed by two longitudinal sharp carinae, of which the posterior measures about two-thirds of the anterior and situated immediately behind it, though a little more inward; in the adult specimen two small tubercles are observed behind one another, of which the posterior is the larger, midway between the anterior part of the median crest and the longer border-crest, but in young specimens the anterior moiety of this tergum is smooth. The much smaller posterior moiety of the 6th tergum is bounded laterally by a longitudinal crest, which is as long as the posterior of the two that bound the anterior moiety and which posteriorly curves inward; between this crest and the median crest runs a longitudinal ridge, parallel with these crests and placed somewhat nearer to the median crest than to the lateral or boundary one. The pleuron is traversed longitudinally by a crest, which is obsoletely divided into 3 or 4 mostly inconspicuous tubercles, while the terminal spine is directed backward.

The telson, measured along the upper lateral edges, projects in adult specimens by one-fifth, in young ones by almost one-third its length beyond the uropods; the tip is not or only slightly turned upward, the upper surface faintly grooved, a rounded tubercle, ending in a small sharp point, occurs at the base in the median dorsal line and the lateral edges are entire.

Eyes in the adult blackish or mouse-coloured, in the youngest specimen of a drab tinge; their major diameter measures in the adult one-fifth, in the youngest specimen one-sixth the length of the rostrum, between the tip and the orbital margin; a very small acute tubercle exists anteriorly near the cornea.

The antennular peduncle reaches usually by half its terminal joint beyond the antennal scale, but in one female, which is 90 mm. long from tip of rostrum to tip of telson, the peduncle is just as long as the scale; terminal joint half as long as 2nd, both together only one-seventh shorter than basal joint. Inner flagellum as long as the peduncle, outer slightly shorter, the two proximal third parts a little enlarged.

The antennal peduncle extends to the distal fourth of 2nd antennular article; the antenna scale (Fig. 59*b*) measures almost half the length of the rostrum and is almost twice as long as broad, it shows its greatest width a little behind the middle, the inner margin is more

strongly curved than the outer, while only in one specimen of medium size the minute spinule on the outer margin was observed, nearly at the posterior third.

The external maxillipeds reach as far forward as the antennal scale or are but little shorter. The legs of the 1st pair reach to the far end of the penultimate joint of the outer maxillipeds, those of the 2nd pair project, in the largest specimen, by the chela beyond the apex of the antennal scale, in the other specimens they become shorter according to their age, so that they reach in the youngest individual, which is 54 mm. long, only to the middle of that appendage. The 2nd legs are at every age shorter than any of the three posterior peraeopods, which regularly decrease in length from the 3rd to the 5th; in the largest specimen the peraeopods of the 3rd pair project by the dactylus and two-fifths of the propodus beyond the tip of the antennal scale, while those of the 5th pair just reach to that tip; in the youngest specimen, long 54 mm., the 3rd pair extend only by half the dactylus beyond the scale and those of the 5th almost to the tip. The dactyli of the 3rd pair measure one-third the propodi and are grooved above along the two distal third parts; the dactyli of the 4th pair (Fig. 59*c*, 59*d* and 59*e*) are $1^2/_3$-times as long as those of the 3rd, they are nearly half as long as the propodi, their upper side is broadly grooved to near the articulation and longitudinally ridged nearly in the middle from the tip to near the base; the dactyli of the 5th pair, finally, are, like in some other species of this genus, a little shorter than those of the 4th, are about half as long as the propodi and resemble also in the other details the dactyli of the 4th pair.

Ova large, 2,5—3 mm. broad.

The young female from Stat. 18 is 56 mm. long from tip of rostrum to tip of telson and certainly belongs to this species. The eyes are still of a drab colour. Two small granules, placed close together, exist on the swelling of the hepatic region, about midway between the anterior border of the carapace and the hepatic groove, like in the other specimens.

Glyph. sicaria Faxon from the Gulf of Panama differs by the following. The upper surface of the rostrum is plane and smooth, not corrugated, and the lower surface has no median keel. The branchiostegal spine is more strongly directed downward in a lateral view. The anterior moiety of the 4th or lateral crest is not armed with spines, but broken into two tubercles, the posterior of which is the more prominent. The tubercles on the gastric region do not tend to form very well-marked carinae.

8. *Glyphocrangon megalophthalma* de Man. Pl. XX, Fig. 60—60*f*.

Glyphocrangon megalophthalma J. G. de Man, in: "Tijdschr. d. Ned. Dierk. Vereen." (2) Dl. XVI, Afl. 2 and 3, 1918, p. 296.

Stat. 48. April 13. 8°4′.7 S., 118°44′.3 E. Flores Sea. 2060 m. Bottom fine, grey mud; partially green. 2 young females.

Stat. 76. June 9. 4°22′.1 S., 118°16′.9 E. Strait of Makassar. 2029 m. Bottom fine, grey mud (Globigerina). 2 females, one of which is full-grown, ovigerous, the other of medium size.

Stat. 208. Sept. 22. 5°39′ S., 122°12′ E. South of Muna Island. 1886 m. Bottom solid green mud. 1 adult male.

This species, which inhabits the sea south of Celebes, is apparently closely related to

Glyph. longirostris (S. I. Smith) and to *Glyph. vicaria* Faxon, of which the former is found on the east coast of the United States, the latter off the Galapagos Islands. Numerous specimens, which in 1891 had been taken by the "Albatróss" off the Galapagos Islands and in the neighbouring seas, were first referred by Faxon, though with some doubt, to *Glyph. nobilis* A. M.-Edw. in his great work, published 1895, on the Stalk-eyed Crustacea obtained by that expedition, but in the following year, when he had the occasion of studying specimens of the true *Glyph. nobilis* A. M.-Edw., captured by the "Blake" in the Gulf of Mexico, the species from the west coast was recognized by him as a distinct form to which the name of *vicaria* was given (W. Faxon, in: Bull. Museum Comp. Zool. at Harvard College. Vol. XXX, N° 3. Cambridge, Mass., 1896, p. 159, footnote). Unfortunately this *Glyph. vicaria* has never been figured.

The whole body of *Glyph. megalophthalma* is covered with a close velvety tomentum. The length of the rostrum and of the carapace, measured from the level of the orbital margin respectively to the apex of the former and to the posterior margin of the latter, in the median dorsal line, proved to be the following: in the adult ova-bearing female from Stat. 76 13,5 mm., 22 mm., in the other female 15 mm., 17,5 mm., in the adult male 13 mm., 17,3 mm. and in the two young specimens from Stat. 48 12 mm., 14 mm. and 13,2 mm., 12 mm. These numbers indicate that in the full-grown female, the largest of all the specimens, the rostrum is one-third, in the adult male one-fourth shorter than the carapace and that in the other younger specimens the rostrum is also shorter than the carapace, though the difference is less, except in the younger specimen from Stat. 48, that is the smallest of all, measuring 55 mm. from tip of rostrum to tip of telson, for here the rostrum is a little ($^1/_{10}$) longer than the carapace. As results from Faxon's description of 1895 the rostrum of *Glyph. vicaria* is constantly much longer. Like in other species the rostrum is at first a little turned downward and the rest curved upward, in the full-grown female from Stat. 76 this distal upturned part measures one-fourth, in the other specimens about one-third the whole length of the rostrum from the apex to the orbital margin; in the full-grown specimen the tip curves upward to the level of the subdorsal crest of the carapace, in the other specimens it reaches almost the level of the upper border of the carapace. The rostrum extends in the full-grown specimen from Stat. 76 only by one-sixth of its length beyond the apex of the antennal scale, in the other specimens by one-third or nearly so, excepting the youngest specimen where it projects almost by half its length beyond the scaphocerite. The median carina of the upper surface that is traceable to the base of the rostrum, is anteriorly distinctly elevated above the lateral margins in the male and in the other specimens, though hardly in the adult female; at either side of it the upper surface is smooth, in *Glyph. vicaria*, however, transversely corrugated. The grooved lower border of the rostrum appears anteriorly in the male and in the youngest specimen indistinctly carinate in the middle line, in the other specimens a median ridge does not seem to be developed. The anterior of the two pairs of spines, with which the rostrum is armed, reaches just beyond the front border of the eyes, while the posterior pair stand above the orbital margin; the spines of both pairs are sharp and acute, those of the posterior are a little shorter than the spines of the anterior and as long as broad at base, those of the anterior distinctly longer than broad at base. The distance of the line uniting the spines of the posterior pair from the line uniting

those of the anterior is just as long as the distance between the two spines of the posterior pair; lateral margins between the two pairs slightly concave.

The antennal spine is directed obliquely upward; in the male it is somewhat turned outward, though not so much as in *Glyph. longirostris* (S. I. Smith) (Report Decap. Crust. Albatross Dredgings. Wash. 1886, Pl. IX, fig. 4) and reaches almost to the front border of the eyes, when the carapace is looked at from above. The younger female from Stat. 76 agrees with the male, in the full-grown female from this Station and in the larger specimen from Stat. 48 this spine is hardly turned outward, contiguous to the eye, and in the former the tip is even slightly curved inward, while it reaches to the distal third of the eye, in the youngest specimen, finally, the spine is as much turned outward as in the male and reaches distinctly beyond the front border of the eye. Branchiostegal spine hardly longer, directed slightly outward and downward, as much as in *Glyph. longirostris* (S. I. Smith, l. c., Pl. VIII, fig. 2). Compared with those of *Glyph. Sibogae* de Man the orbital and branchiostegal spines show in *Glyph. megalophthalma* a more slender form.

The anterior tubercle of the anterior moiety of the subdorsal crest has a conical form with the acute tip directed forward and a little outward, in *Glyph. Sibogae* this tubercle is less prominent, blunt, rarely subacute; the distance, measured in the median dorsal line, between the line uniting the apices of the rostral spines of the posterior pair and the line uniting the tip of this anterior tubercle of the subdorsal crest with that of its fellow at the other side, appears in *Glyph. Sibogae* half as long as the length of the latter line, while in *Glyph. megalophthalma* that distance measures little more than one-third the distance between the anterior tubercle of the subdorsal crest and its fellow (Confer fig. 59 and fig. 60). As regards the shape and the direction of the dorsal and subdorsal crests and the number of tubercles, by which they are formed, this species resembles *Glyph. Sibogae*; the tubercles are also eroded and corroded, but they are a little more prominent and more or less subacute, the tubercles of the posterior moiety of the subdorsal crest are moreover a little smaller. Hepatic and cervical grooves deep. Hepatic area a little swollen, with two small blunt, conical tubercles near the anterior tooth of the lateral crest, situated behind one another and of which the anterior is a little larger than the posterior. Posterior moiety of the dorso-lateral crest as in *Glyph. Sibogae*, entire, straight, obsoletely sinuate just behind the middle and with obtuse, anterior extremity; between this extremity and the anterior acute tubercle of the subdorsal crest are situated on the upper border of the hepatic groove 4 or 5 hardly prominent tubercles, of which the two anterior are smaller than the posterior. The anterior moiety of the 4th or lateral crest is broken by a shallow notch into two parts; the anterior part is produced anteriorly to form a sharp spine or tooth, that is directed forward and outward and that has the same size as the anterior conical, acute tubercle of the subdorsal crest; this spine falls far short of the anterior border of the carapace. The part behind the notch forms merely an obtuse angle, that projects much less laterally than the anterior spine. The posterior moiety is also straight, entire, with obtuse anterior extremity, it is less prominent than the posterior moiety of the dorso-lateral crest and quite posteriorly 2 or 3 small tubercles are observed between the posterior extremities of both moieties.

In *Glyph. vicaria* the tubercles of the first and second crests of the carapace are more prominent and spiniform than even in *Glyph. nobilis* A. M.-Edw. (W. Faxon, l.c., 1896), but in the latter they are more prominent than in *Glyph. megalophthalma*, as results from the figure 2*a* of Plate 39 of the "Recueil de Figures de Crustacés nouveaux ou peu connus", published by A. Milne-Edwards in April 1883. The anterior moiety of the 4th crest is divided in *Glyph. vicaria* by a deep notch, in the new species by a rather shallow one.

As regards the shape of the abdominal somites and the number, the arrangement and the relative size of the tubercles, with which they are covered, *Glyph. megalophthalma* resembles *Glyph. Sibogae*, but the tubercles are all more or less distinctly carinate, while in *Glyph. Sibogae* they are rounded and obtuse. The form and the size of the pleura and of the spines in which they end inferiorly, is like in *Glyph. Sibogae*. In the full-grown female from Stat. 76 the telson reaches only by one-eighth of its length beyond the uropods, but in the other female, long 74 mm., from the same Station by one-fourth, in the male from Stat. 208 by one-fifth and in the youngest specimen from Stat. 48 by one-third; only a small part near the tip is slightly curved upward, a more or less compressed tooth stands at the base, and the lateral margins are in the full-grown female quite smooth proximally as in the two youngest specimens, but in the male and in the other female from Stat. 76 traces of a fine serrulation are discernible.

The eyes, that are light leather-coloured, not dark, are, especially in proportion to the rostrum, of a large size; in the full-grown female the proportion between the length of the carapace, including the rostrum, and the greatest diameter of the eye is as 6,4 : 1, in the other female from the same Station as 7,4 : 1, in the male as 7,1 : 1 and in the larger specimen from Stat. 48 like 7,6 : 1, while in the youngest specimen, long 55 mm., the greatest diameter measures only $^1/_9$ the distance of the tip of the rostrum to the posterior border of the carapace. In the full-grown female the proportion between the length of the rostrum and the greatest diameter of the eye is as 2,5 : 1, in the male like 3,1 : 1 and in the youngest specimen as 4,6 : 1, the eye appearing in the young specimens relatively much smaller than in the adult.

Both in the male and in the female the antennular peduncle projects with the terminal joint beyond the antennal scale; in the adult female the 2nd joint is 3-times as long as thick in the middle and about twice as long as the terminal joint, in the male the peduncle has a stouter shape, the 2nd joint is not yet twice as long as thick in the middle and the terminal joint, that is just as long as broad anteriorly, is but little shorter than the 2nd. Outer flagellum, as usual, in the male more enlarged than in the female.

Antennal peduncle in the male as long as the antennal scale, in the female little shorter than it; it has in the male a less slender shape than in the female. The antennal scale (Fig. 60*b*) measures in the male one-fourth, in the full-grown female a little more than one-fourth the length of the carapace, rostrum included; the scale, in the male twice, in the full-grown female almost twice as long as broad, has an oval shape, the inner margin is not more strongly curved than the outer, that shows nearly at the proximal third a microscopical spinule or prominence. Different from all other species, known to me, both margins show, not far from

the obtuse tip, a characteristic indentation, that looks like a contusion: in the full-grown female the two indentations occur on the right scale at the same level, on the left the indentation of the outer margin is a little farther distant from the tip than that of the inner and also in the other specimens the position is not always the same.

The external maxillipeds reach in the male and in the younger female from Stat. 76 just beyond the antennal scale, in the other specimens to the tip.

The peraeopods of the 1st pair reach, with the dactylus extended, to the middle of the antennal peduncle. The legs of the 2nd pair reach in the male by the chela and one-sixth the carpus beyond the antennal scale, in the full-grown female they are damaged, but in the younger female from Stat. 76 by the chela and one-fourth of the carpus and in the youngest specimen they reach only to the tip; the 2nd legs are decidedly shorter than any of the three posterior legs. The latter (Fig. 60*c*, 60*d*, 60*e* and 60*f*) resemble those of *Glyph. Sibogae*.

Eggs few in number, large, greatest diameter 3,5 mm.

The largest specimen, the ovigerous female from Stat. 76, is 86 mm., the male from Stat. 208 73 mm. long from tip of rostrum to tip of telson.

Glyph. vicaria Faxon apparently differs from this new species by the following. The upper surface of the rostrum is corrugated and the rostrum is constantly longer. The tubercles of the dorsal and subdorsal crests are more prominent and spiny. The anterior moiety of the 4th crest is divided by a deep notch. The tubercles of the abdomen are probably more sparse and less pronounced, the dorsal carinae of the telson, finally, are dentate anteriorly.

Glyph. longirostris (S. I. Smith) differs by the upper surface of the rostrum being corrugate, by the orbital spine being directed much more outward and by the anterior moiety of the 4th or lateral crest being continuous, not notched, the dorsal carina and the tubercles of the abdomen, finally, are obtuse, not carinate.

9. *Glyphocrangon (Plastocrangon) caeca* W.-Mas. Pl. XX, Fig. 61.

Glyphocrangon caeca J. Wood-Mason, Annals Mag. Nat. Hist., Nov. 1891, p. 358.
Glyphocrangon (Plastocrangon) caeca A. Alcock, A descript. Catalogue Indian Deep-Sea Crustacea, Calcutta, 1901, p. 135.
Illustrations of the Zoology of the Investigator, Crustacea, Plate VII, fig. 1.

Stat. 170. Aug. 26. 3° 37'.7 S., 131° 26'.4 E. Between Ceram and New Guinea. 924 m. Bottom fine grey mud. 1 adult male.

Measured in the middle line, the rostrum proves to be 10 mm. long, the carapace 14 mm., the abdomen 37 mm., entire length 61 mm.: the largest male, hitherto known, was 53,5 mm. long, the largest female 64 mm. In our specimen the rostrum measures almost three-fourths the length of the rest of the carapace and appears thus comparatively a little longer than in the Indian specimens; the three proximal fourth parts are slightly directed downwards, the distal fourth upcurved, though not yet reaching the level of the upper border of the carapace. The median ridge, traceable to the faint rostro-gastric groove, is anteriorly not elevated above the lateral margins and bears anteriorly at either side 5 or 6 deep pits, that do not occur on the distal curved part nor reach backward to the anterior pair of spines.

Spines of the anterior pair twice as large and more pointed than those of the posterior, distance between those of the posterior pair 1,7-times as large as the distance between the anterior spines, distance between the two pairs, in the middle line, almost twice as long as that between the spines of the anterior pair.

Of the 4 subacute tubercles of the anterior moiety of the dorsal crests the 4th or posterior is the largest, the 2nd a little smaller, the 1st and the 3rd, that are equal, the smallest; between the two crests are two closely-parallel rows of much smaller granules, the granules of one row alternating with those of its fellow. Cardiac area separated on each side by a narrow groove from the branchial regions. The two tubercles of the posterior moiety of the dorsal crest are obtuse and nearly as large as the posterior tubercle of the anterior moiety. Anterior moiety of subdorsal crest broken up into three tubercles, of which the 3rd or posterior is the largest and subacute, the 2nd the smallest, the 1st or anterior is truncate and appears even slightly concave on the tip; this anterior tooth should, as in other species, be more rightly considered as a third rostral tooth. The 3 tubercles of the posterior moiety of the subdorsal crest are rather blunt and increase in size and length from the 1st or anterior to the 3rd. Between the posterior moieties of the dorsal and subdorsal crests an arched row of 4 small subacute granules runs from the cervical groove backward; the two anterior are larger than the posterior and the row reaches to midway between that groove and the posterior border of the carapace. Posterior moiety of 3rd crest with tuberculiform, though blunt, anterior extremity and obsoletely notched in the middle.

The median carinae of the abdomen are described by Alcock in 1901 as "less sharply cut, those of the 2nd, 3rd and anterior half of 4th terga (being) obsolescent"; in the present male they are well-developed and conspicuous, the carinae of the 1st to 5th terga are divided into two parts by a notch, while that of the 6th is obsoletely notched not far from the posterior extremity. Looked at from above the carinae of the 1st to 3rd terga appear rounded or obtuse, like the anterior part of the 4th; the posterior part of the 4th carina, twice as long as the anterior, is longitudinally grooved and this is also the case with the anterior half of the lateral parts of the trifurcate crest on the 5th tergum; the two parts of the median carina of this tergum and the carina of the 6th are subacute. As already observed, each tergum is divided by a transverse groove in an anterior and a posterior part. In the figures 1 and 1*a* of the "Illustrations" no tubercles appear on the posterior part of the terga, excepting the 1st, in the present male, however, one observes here on the 2nd somite at either side of the median crest two tubercles, of which the outer is a little larger than the inner, on the 3rd they are rather indistinct, though the outer is recognizable by an impressed point, and on the 4th tergum one little prominent tubercle, marked with a transverse line, exists at either side of the median crest. Telson little longer than the uropods, the edges salient and smooth, the median ridge extending along the anterior fourth.

Eyes pale straw-coloured, their major diameter (2,25 mm.) contained 4,4-times in the length of the free portion of the rostrum; the left eye is a little smaller than the right, in both the peduncle bears a small acute tooth anteriorly near the cornea, as in other species.

While in the typical species the antennular peduncle attains not the tip of the antennal

scale, in the male from Stat. 170 it projects by half the terminal joint beyond it; 3rd joint a little broader and shorter than 2nd. Outer flagellum (16 mm.) slightly more than twice as long as the peduncle and a little longer than the carapace excluding the rostrum, proximally expanded and passing just beyond the middle into the filiform terminal part; inner flagellum little shorter than outer.

Antennal scale about one and a half as long as broad, 6 mm. long, 3,75 mm. broad, broadest just behind the middle and with a small spinule at the proximal third part of the outer margin. Terminal joint of right antennal peduncle slightly shorter than that of the left, the peduncle reaching therefore in the latter to the tip of the antennal scale, while that of the right is slightly shorter than it. External maxillipeds reaching almost to the tip of the antennal scale, in the Indian specimens only to the middle.

The legs of the 2nd pair reach almost to the apex of the antennal scale, those of the 3rd project by the dactyli beyond it, the 4th are slightly shorter and the 5th reach to the distal third of the scale. The dactyli of the 3rd pair measure little more than one-third of the propodi, those of the 4th two-thirds their propodi, while the dactyli of the 5th pair are a little shorter than those of the 4th; they show the same lanceolate form as in most other species of this genus, the dactyli of the two last pairs grooved along their whole length, those of the 3rd only along the distal third part of the upper side, the rest being rather convex; as usually the propodi of the two last pairs end in a brush of setae.

This specimen (in spirit) has a cream colour, the tips of some spines are red, namely the apex of the rostrum, of the anterior pair of rostral spines, of the orbital, the branchiostegal and the large wing-like spine of the 4th carina, of the short spines on the lower border of the pleura, the apex of the telson, the hairs on the two last joints of the external maxillipeds and the dactyli of the 1st pair of legs.

General distribution: Bay of Bengal, near the Andamans.

10. *Glyphocrangon (Plastocrangon) Faxoni* de Man. Pl. XX, Fig. 62—62*c*.

Glyphocrangon (Plastocrangon) Faxoni J. G. de Man, in: "Tijdschr. d. Ned. Dierk. Vereen." (2) Dl. XVI, Afl. 2 and 3, p. 298.

Stat. 12. March 14. 7° 15′ S., 115° 15′.6 E. Bali Sea. 289 m. Bottom mud and broken shells. 1 adult, though much mutilated female, without eggs.

Stat. 297. January 27, 1900. 10° 39′ S., 123° 40′ E. Between the islands of Rotti and Timor. 520 m. Bottom soft, grey mud with brown upper layer. 1 egg-bearing female.

A new species which I have the pleasure to dedicate to Mr. Walter Faxon, the author of the valuable Report on the Stalk-eyed Crustacea, obtained by the "Albatross" in 1891. It belongs to that Section of the genus, in which the anterior half of the 4th or lateral crest of the carapace is cut into two small teeth, the anterior of which falls short of or hardly extends beyond the anterior border of the carapace. It is therefore related to *Glyph. (Plastocrangon) caecescens* W.-Mas., but differs from it by the shape of the posterior moiety of the 3rd or dorso-lateral crest and by the smoother surface of carapace and abdomen between the crests.

Carapace and abdomen are glabrous, naked. The rostrum (Fig. 62*c*) of the female from

Stat. 297 is 11,5 mm. long, carapace 13 mm., abdomen 30,5 mm., entire length 55 mm. The rostrum of this rather small species, of which the female from Stat. 297 is regarded as the type, is but little shorter than the carapace and reaches by a little more than one-third its length beyond the antennal scale; the two proximal third parts are slightly directed downward, the distal third curved upward. Median ridge little prominent, traceable to near the faint fronto-gastric groove, not elevated anteriorly above the lateral margins; midway between the tip and the anterior pair of spines three or four transverse corrugations are visible. Anterior pair of spines just in front of the eyes, posterior pair immediately behind the orbital margin, spines of the anterior pair larger and more pointed than those of the posterior, the latter as far distant from one another as the spines of the anterior pair, both pairs a little farther distant from one another than are the spines of each pair; lateral margins between both pairs nearly parallel. Orbital spine directed obliquely upward and forward, contiguous to the eye, so that, when the carapace is looked at from above, the orbital spine is partly concealed by it and directed almost straight forward; branchiostegal spine twice as long as the orbital spine, directed straight and horizontally forward and reaching to the middle of the antennal scale and to the far end of basal antennular article.

Cervical groove well-developed. Anterior part of dorsal crest divided into five obtuse tubercles of unequal length, the 1st or anterior the longest, the 3rd, 2nd, 4th and 5th regularly diminishing in length; in front of the 1st tubercle, though a little nearer to the median line, a 6th more conical obtuse tubercle is observed and as usual, in front of this pair, a small subacute tubercle is seen in the middle line; 6 or 7 small granules occur anteriorly between the two crests, but more than the posterior half of the surface between both is smooth. The two dorsal crests slightly converge backward; behind the cervical groove each crest consists of two tubercles, the anterior slightly longer than the anterior tubercle of the anterior part, the posterior nearly as long. Anterior moiety of subdorsal crest formed by three subacute tubercles, of which the 1st should more rightly be regarded as a third rostral tooth; this tooth is situated a little nearer to the posterior rostral tooth than the latter to the anterior, it is also a little larger than the two other teeth of this part, that are equal. The posterior half of the subdorsal crest is also formed by three, low, obtuse tubercles, of which the middle is the longest, then follows the 3rd, then the 1st or anterior. One observes on the gastric region between the anterior tubercle of the dorsal and the second tubercle of the subdorsal crest, immediately behind the fronto-gastric groove, a subacute tubercle of the same size as the last mentioned tubercle and behind it one or two smaller granules. A small obtuse tubercle occurs likewise, immediately behind the cervical groove, between the anterior tubercles of the posterior moieties of the 1st and 2nd carinae and one or two exist more posteriorly. The hepatic region bears, posterior to the base of the branchiostegal spine, a little nearer to this base than to the hepatic groove, a rather blunt, longitudinal tubercle, that perhaps may be considered as a trace of the anterior moiety of the dorso-lateral crest, and one or two very small granules exist close to the groove that separates posteriorly the hepatic from the branchial region; for the rest the hepatic region is perfectly smooth. The posterior moiety of the dorso-lateral crest is divided by two notches into three lobes or tubercles, the anterior lobe is the smallest or shortest and

subacute; on the right side the 2nd and 3rd lobe are equal, twice as long as the anterior, both are obtuse and the outer margin of the 2nd is straight, though showing a small granule at the posterior fourth; on the left side the outer margin of the 2nd lobe is deeply and angularly notched, so that this moiety has an appearance different from the right side. Just outside the anterior tubercle of the posterior moiety of the subdorsal crest a small granule is observed and another small granule occurs outside of the posterior end of this crest, for the rest the surface is quite smooth between the posterior moieties of the subdorsal and dorso-lateral crests. The anterior of the two teeth into which the anterior half of the 4th or lateral carina is divided, is acute, the posterior rather blunt; the anterior just projects beyond the orbital margin, reaching as far forward as the margin between the orbital and the branchiostegal spine. The posterior moiety of the lateral crest is obsoletely notched at the posterior third, its anterior extremity is obtuse and in front of it at the inner side a blunt tubercle is observed just above the outer extremity of the hepatic groove, but for the rest the surface is smooth between the posterior moieties of the 3rd and 4th carinae, excepting a small granule near the posterior border of the carapace. Just below the posterior moiety of the lateral crest on the right side one, on the left three small granules or tubercles occur.

The three first somites of the abdomen much resemble those of *Glyph. (Plastocrangon) caeca* W.-Mas., as regards their form and tuberculation, but the 4th, 5th and 6th are shorter with regard to their width and their tuberculation is different. The median crest of the 1st tergum is moderately prominent, rounded above and anteriorly, the two lateral teeth resemble the median, but appear obtuse, not broadly rounded, when looked at from above; on each side of the median tooth a small obtuse tooth occurs. On the posterior part of the 1st tergum are situated at either side 3 or 4 rounded small granules, of which the inner is distinctly larger than the others. Pleuron of 1st somite with 2 tubercles near the anterior margin, of which the lower is subacute, the upper obtuse; infero-anterior angle subacute. Median carina of 2nd tergum notched in the middle, obtuse, little prominent; at either side of the anterior part 3 tubercles are situated, of which the middle is the largest, the inner the smallest; at either side of the posterior part two hardly prominent tubercles are found, of which the inner is larger than the outer. On the pleuron of the 2nd somite 3 rounded tubercles are placed in a triangle between the anterior border and the median swelling, the upper tubercle is a little larger than the two lower placed abreast; antero-inferior angle rounded, postero-inferior angle sharp, median tooth acute. Median crest of 3rd tergum entire, the transverse furrow faint, not reaching to the crest; as on the 2nd also at either side of the anterior part of the 3rd tergum three tubercles are placed, of which the middle is the largest and placed with the outer near the anterior transverse furrow, while the inner is the smallest and situated near the faint posterior groove; the tubercles of the posterior part of this tergum are inconspicuous. There are no tubercles on the pleuron of the 3rd somite, but the median swelling ends inferiorly in a small subacute tooth, that is directed forward; the pleuron ends in two sharp teeth, of which the anterior is larger than the small posterior. Posterior transverse groove of 4th somite only there developed where the tergum passes into the pleuron; median crest moderately prominent, obsoletely notched at the anterior fifth and the larger remaining part longitudinally fluted; one rather indistinct tubercle is observed

at either side of the anterior fifth and another still smaller one near the antero-lateral angle. Pleuron of 4th somite resembling that of 3rd. On the 5th tergum the median crest is trifurcate like in other species, median part broadly interrupted, the anterior part subacute in a lateral view, the lateral branches longitudinally fluted. At each side of the anterior part of the crest are situated two tubercles, of which the outer near the lateral crest is a little smaller than the inner; a somewhat larger, third tubercle exists posteriorly just in front of the groove and laterally. The pleuron is furnished above between the swelling and the longitudinal crest by which it is separated from the tergum and which is notched quite anteriorly, with three tubercles and it terminates below in two sharp teeth or spines, of which the posterior is a little larger than the other. Median crest of 6th somite prominent, more compressed laterally than the preceding and distinctly indented at the anterior fourth; this tergum is separated from the pleuron by three subacute tubercles situated behind one another, a fourth though smaller tubercle occurs between the posterior one of these three and the median crest. Instead of a swelling the pleuron of the 6th somite bears a curved row of three subacute tubercles, of which the two anterior are placed near one another, the third more posteriorly; terminal spine comparatively large, acuminate, directed backward. Telson a little longer than the uropods, deeply grooved, the lateral edges smooth; the telson is not crested in the middle anteriorly, but bears at base a small, median, acute tooth; proximal third of lower margins serrulate.

All the crests and tubercles of carapace and abdomen are distinctly punctate.

Eyes equal, of a drab colour; their major diameter measures about one-fifth the length of the free portion of the rostrum and, as in other species, there is a small tubercle anteriorly near the cornea.

The antennular peduncle projects by the terminal joint beyond the tip of the antennal scale; terminal joint half as long as 2nd, 2nd and 3rd together nearly two-thirds the length of basal article.

Antennal peduncle reaching to the far end of the 2nd joint of the peduncle of the inner antennae; scaphocerite as long as the antennal peduncle, oval, twice as long as broad, with a small spine just in front of the middle of the outer margin.

External maxillipeds as long as the antennular peduncle.

Peraeopods of the 2nd pair reaching by the chela and one-third of the carpus beyond the tip of the antennal scale, much longer than the three posterior peraeopods. Those of the 3rd pair extend to the tip of the antennal scale, those of the 4th reach by one-third the dactyli beyond it; the 5th pair are hardly shorter than the scale. The dactyli of the 3rd and 5th pair are half as long as the propodi, those of the 4th, about one and a half as long, are but little shorter than the penultimate joints; the propodi of the two last pairs end in a brush of setae and the dactyli resemble those of *Glyph. (Plastocrangon) caeca* W.-Mas.

Eggs not numerous, of a rusty colour, major diameter 2,3 mm.

The female from Stat. 12 not fully agrees with that from Stat. 297. It is a little larger, the abdomen being 33 mm. long; unfortunately the rostrum is mutilated, like also the right half of the carapace. The differences from the type are the following. The orbital spine is not contiguous to the eye, but a little remote from it. Instead of the blunt tubercle on the

hepatic region, two small tubercles of equal size are situated obliquely behind ons another, between the base of the orbital spine and the posterior of the two teeth, into which the anterior moiety of the lateral crest is divided; the small granule posteriorly is, however, wanting. The dorsal crest is formed by 4 or 5 tubercles, of which the posterior but one ie much larger and longer than the others, that are subequal, small and obtuse. The two posterior lobes of the posterior moiety of the dorso-lateral crest are hardly separated. The median crest of the 2nd tergum is a little more prominent, entire, not notched at all and the pleuron of the 2nd somite bears 5 instead of 3 tubercles between the anterior margin and the swelling. The median crests of the following terga are also more prominent and that of the 6th is entire, not notched posteriorly. When these differences should prove to be constant and to be not individual, this form should be regarded as a variety.

Family Crangonidae.

The genus *Naushonia*, described by Professor J. S. Kingsley in 1895 in the Bulletin of the Essex Institute, Vol. XXVII, p. 95, Pl. III, figs. 8—10, contains but one species, *Naush. crangonoides* Kingsley, which Professor Hermon C. Bumpus, of Brown University, had obtained from the Island of Naushon, one of the Elizabeth Islands, on the southern coast of Massachusetts: the only specimen was found July 13, 1893, in the sand of the small channels — the so-called gutters — of that island. In my opinion this interesting form is closely related to the genus *Coralliocrangon* Nobili (G. Nobili, Annal. Scienc. Nat. 9e Série, Zool. T. IV, 1906, p. 82, Pl. 4, figs. 2—2*i*), of which the only representative was found at Djibouti. In both genera a well-marked impressed straight line extends from the antero-external angle of the carapace on either side to the posterior margin, by which the carapace is divided into a dorsal median and two lateral branchiostegal parts. In his valuable paper on the Indian Crangonidae (Records Indian Museum, Vol. XII, Part. VIII, 1916, p. 384) this line is considered by Mr. Stanley Kemp, for *Coralliocrangon*, to represent the "linea thalassinica" of some *Thalassinidea*, the persistence of which in this genus points to its being a survival of some very primitive form: now apparently the same may be said with regard to the genus *Naushonia*. In both genera the peraeopods of the 2nd pair are simple, non-chelate, the three posterior pairs are much similar, and the subchela of the 1st pair bears such a great resemblance in both, that differences are hardly perceptible. The two genera are nevertheless distinguished by their mandibles. In *Coralliocrangon* the mandibles are simple, dentate, with a three-jointed palp, in *Naushonia* they are "stout, incurved, the cutting edge excavate anteriorly, the edge itself serrate", their palp is two-jointed and "the cutting edge of the mandible recalls somewhat that of the Atyidae, but the palpus is not present in that family". In the figure 8 of Kingsley's paper, which represents the mandible, the palp has been omitted; the right part of the figure looks like the dentate incisor, the left as the molar process. In *Coralliocrangon* the mandibular palp is described as very hairy, "très poilu", in *Naushonia* it "bears simple hairs on its inner, and stiff bristles on its outer margin". In Kingley's genus the peraeopods are provided with small exopodites, that are not described by Nobili. The branchiae of *Naushonia* are unknown.

Besides these two forms and the genera *Sabinea* Owen and *Prionocrangon* W.-Mas., also in the genus *Vercoia* Baker the peraeopods of the 2nd pair are simple, non-chelate.

The family Crangonidae contains thus at present 11 genera, which may be distinguished by the following key.

Key to the genera of Crangonidae.

a_1 Peraeopods of 2nd pair present.
  b_1 Peraeopods of 2nd pair chelate.
    c_1 Fourth and fifth pairs of peraeopods having the seventh joint not dilated, not natatorial.
      d_1 Peraeopods of 2nd pair subequal in length to the rest.
        e_1 Carapace without strong sculpture . . . . . **Crangon** Fabr.
          f_1 An arthrobranch present at base of third maxillipeds Subgenus **Crangon** Fabr.
          f_2 No arthrobranch at base of third maxillipeds. . Subgenus **Notocrangon** Cout.
        e_2 Carapace with very strong sculpture.
          No arthrobranch at base of third maxillipeds. . . **Sclerocrangon** G. O. Sars
      d_2 Peraeopods of 2nd pair much shorter than the rest.
        e_1 Inferior apices of branchiae turned backwards. Branchiae 6 or 7 in number . . . . . **Pontophilus** Leach.
        e_2 Inferior apices of branchiae turned forwards. Branchiae 8 in number . . . . . **Aegeon** Guér.-Ménev.
    c_2 Fourth and fifth pairs of peraeopods having the seventh joint dilated, natatorial . . . . . **Argis** Kröyer
  b_2 Peraeopods of 2nd pair simple, non-chelate.
    c_1 Eyes well-developed. (In *Naushonia* the cornea is represented by a minute pigment spot.)
      d_1 Carapace without "linea thalassinica". Mandibles without palp.
        e_1 Antennal scale well-developed, the outer margin terminating in a distal spine . . . . . **Sabinea** Owen
        e_2 Antennal scale short, feeble, subtriangular, without distal spine . . . . . **Vercoia** Baker [1])
      d_2 Carapace with "linea thalassinica". Mandibles with palp.
        e_1 Mandibles simple, palp three-jointed. . . . . **Coralliocrangon** Nobili
        e_2 Mandibles excavate, with dentate incisor and blunt molar process; palp two-jointed. . . . . **Naushonia** Kingsley
    c_2 Eyepeduncles transformed into a pair of trihedral processes, with acute and somewhat divergent tips; eyes absent. **Prionocrangon** W.-Mas.
a_2 Peraeopods of 2nd pair wanting . . . . . **Paracrangon** Dana

1) The genus *Vercoia* Baker is included with some doubt in this key, because the mandibles are unknown, while the author did not indicate the differences from the genus *Sabinea* Owen.

Until at present only four species of Crangonidae were known to occur in the Indian Archipelago, two of the genus *Pontophilus* (*Challengeri* Ortm. and *junceus* Bate) and two of the genus *Aegeon* (*pennata* Bate and *propensalata* Bate). Thanks to the remarkable investigations of the Siboga expedition the number of Crangonidae, observed in the Archipelago, has increased to no less than 15 species and 3 varieties! Eight species and one variety, indeed, of *Pontophilus*, five species and two varieties of *Aegeon*, one species of *Prionocrangon* and, last though not least, one species of the genus *Sabinea* are now known to inhabit the Archipelago. The genus *Sabinea* was not yet known to occur in the Indopacific, the discovered species is new to science and differs rather much from the older representatives of this group; of the genus *Pontophilus* three species and one variety, of the genus *Aegeon* one species and two varieties proved to be still unknown.

Of *Crangon crangon* (Linn.) a variety has been recorded from Akyab, Arakan coast (Stanley Kemp, l. c., 1916, p. 379): this form will perhaps once prove to occur also off the coast of Sumatra.

LIST OF ALL THE SPECIES OF CRANGONIDAE, KNOWN AT PRESENT, June 1918.

SPECIES	HABITAT	DEPTH IN FATHOMS
	I. Genus **Crangon** Fabr. 1798.	
	Subgenus **Crangon** Fabr. 1798.	
abyssorum Rathb. 1902.	From Bering Sea to the southern extremity of California	685—1771
acclivis Rathb. 1902.	Off the Trinity Islands, Alaska	159
	The islands situated off the coast of southern California	80—266
affinis de Haan 1849	Petropawlowsk	
	Wladiwostok	
	Japan, from Taraku Island (Nemuro) to Kagoshima and Nagasaki	
	Puget Sound	
alaskensis Lock. 1876.	Off Kurile Islands	14
	Bering Sea and along the Aleutian Islands	$3^1/_4$—41
	British Columbia southward to Puget Sound	5—81
alaskensis elongata Rathb. 1902.	Off the west coast of the United States from off British Columbia as far south as Wilmington, Cal.	9—278
alba Holmes 1900.	From Vancouver Island, British Columbia, to San Diego, California	22—47
Allmanni Kinahan 1857	North East Atlantic from the White Sea and the Murman coast along the whole coast of Norway and Great Britain, the North Sea, to the north side of the Bay of Biscay	In the North Sea 9—69 Irish Sea 20—73 On the north side of the Bay of Biscay 146
	Iceland	
	Skagerrak, Kattegat, Samsobelt, Oresund	
capensis Stimps. 1860.	Cape of Good Hope	12

SPECIES	HABITAT	DEPTH IN FATHOMS
cassiope de Man 1906	Inland Sea of Japan	Deep water
communis Rathb. 1899	From Bering Sea to San Diego, Cal., including Puget Sound and Strait of Fuca	20—309
	Off the south-eastern coast of Kamchatka	96—100
consobrina de Man 1906	Inland Sea of Japan	Deep water
crangon (Linné) 1758	North East Atlantic from the White Sea and East Finmark to the Mediterranean and Adriatic	North Sea 0—20
		Christiania Fjord 30
	Baltic, Pomerania and Rügen	Brevik Fjord 50–65
	Iceland	
crangon (Linné) var. Kemp 1916	Akyab, Arakan coast	
crangon (Linné) var. *Schidlowskii* Ostroumoff 1895	Northern japanese sea	
Dalli Rathb. 1902	Bering Sea and Aleutian Islands to Sitka	$4^1/_2$—61
	Kamchatka, Okhotsk Sea and Kurile Islands	
Franciscorum Stimps. 1856	Off the west coast of North America, from south-eastern Alaska to San Diego, Cal.	3—29
Franciscorum angustimana Rathb. 1902	Off the west coast of North America, from British Columbia to Oregon	11—67
Hakodatei Rathb. 1902	Hakodate; Hokkaido	
Holmesi Rathb. 1902	Off Wilmington, California	27
	Catalina Harbor, California	30—40
	Northwest of Cerros Island, Lower California	58
Lockingtonii Holmes 1904	Magdalena Bay, Lower California	
maculosa Rathke 1837	Black Sea: off Odessa, Sebastopol, Suchum	
munitella Walker 1898	Puget Sound	
	Pacific Grove, California	
	Catalina Harbor, California	30—40
nigricauda Stimps. 1856	West coast of the United States from off Comox, British Columbia, to San Geronimo Island, Lower California	3—31
nigromaculata Lock. 1876	From Northern to Lower California	3—33
orientalis Czern. 1884	Bay of Sebastopol	
	Sachalin	
propinquus Stimps. 1860	Off the northern coasts of Japan	4—20
	Aomori, Rikuoku (Japan)	
resima Rathb. 1902	From Monterey Bay, Cal. to San Domingo Point, Lower California	44—266
sagamiensis Balss 1913	Sagami Bay	
septemspinosa Say 1818	From the Arctic coast of Alaska at Eschscholtz Bay southward along the eastern coast of Bering Sea to the Shumagins	3—8
	Along the east coast of North America, from East Florida northward	
spinirostris Rathb. 1902	Bering Sea and off the Aleutian Islands	276—625
spinosissima Rathb. 1902	Off Oregon and California	51—96
stylirostris Holmes 1900	Santa Cruz, Cal.	
	Trinidad, Humboldt Co., Cal.	
	Chirikof Island, Alaska	9—14

SPECIES	HABITAT	DEPTH IN FATHOMS
variabilis Rathb. 1902	Bering Sea, Alaska Peninsula and Aleutian Islands California	50—695
	Subgenus **Notocrangon** Cout. 1900.	
antarcticus Pfeffer 1887.	South Georgia from about 30° W. to about 50° W.	
antarcticus Pfeffer var. *gracilis* Borr. 1916.	Antarctic Ocean from about 80° E. eastwards to nearly 160° W.	
	II. Genus **Sclerocrangon** G. O. Sars 1882.	
alata Rathb. 1902.	From Bering Sea to Puget Sound	6—91
angusticauda (de Haan) 1849 . .	Japan: Simoda, Hakodate, Kadsiyama, Misaki, Nagasaki	
angusticauda (de Haan) var. *dentata* Balss 1914	Negishi Harbour near Yokohama	25
	Dzushi, Japan	71
atrox Faxon 1893.	Off Acapulco	660
	Near Las Tres Marias	676
Bellmarleyi Stebb. 1914	Cape Natal N. by E. 24 miles (Natal)	440
boreas (Phipps) 1774 [1])	From the Lofotes and Finmark eastward in the Murman Sea, the White Sea, to the south-west coast of Nova Zembla	Along the east coast of America 5—36 N. Greenland 5—40
	Barents Sea. Franz Joseph Land. Spitzbergen. Iceland. Grinnell Land. Baffins Bay. Davis Straits. Labrador and southward along the east coast of America to Cape Cod.	Barents Sea 62, 140
	West Greenland	3—110
	East Greenland	0—50
	Midway on the north coast of Alaska	
	Bering Straits	
	Along the western side of Alaska, at the Aleutians and north-eastern Siberia	
ferox (G. O. Sars) 1877.	North east Greenland	68—125
	West Greenland: Umanak-fjörd	122, 260
	N. E. of the Shetlands	356
	Off the west coast of Norway	417
	Jan Mayen	95
	Spitzbergen	50—532
	Murman Sea, Barents Sea	
	Kara Sea	49—91
intermedia (Stimps.) 1860	Yokohama	
	Okhotsk Sea	
	Bering Sea near Cape Chepoonski	40
	Off the coast of Kamchatka	39—100
	Bering Sea and Aleutian Islands	21—91
	Off Vancouver Island	24

1) As has rightly been remarked by H. J. HANSEN (The Danish Ingolf-Expedition. Vol. III. 2. Crust. Malac. I. Copenhagen 1908, p. 48), it cannot yet be established whether this species is circumpolar and whether it occurs or not along the 120 degrees of longitude north of Asia.

SPECIES	HABITAT	DEPTH IN FATHOMS
intermedia (Stimps.) var. *bidentata* Balss 1914	Sagami Bay, Japan	
Jacqueti (A. M.-Edw.) 1881	East Atlantic	
	Near North Rona	516, 542
	Off the west coast of Ireland	250—542, 707—710
	East coast of the United States between Charleston and Cape Cod	263—959
mauidi Dana 1852	Off the west coast of the United States from Port Etches, Alaska, to San Miguel Island, California	12—53
pressa Faxon 1893	Off Malpelo Island	899
	Off Acapulco	660
	Gulf of California	859, 905
salebrosa (Owen) 1839	Okhotsk Sea	0—10
	Off the coast of Kamchatka	
Sharpei Ortm. 1895	Bering Sea, Aleutian Islands and Alaska Peninsula	35—150
	III. Genus **Pontophilus** Leach 1817.	
abyssi S. I. Smith 1884	East coast of the United States	1917—2221
	Bay of Bengal	1748, 1997
angustirostris de Man 1918	Reef of Batjulmati (Java)	
	Bay of Badjo, west coast of Flores	Up to 22
	Coast of Obi Major	Plankton, at night
	Between Misool and New Guinea	17
	East coast of Aru-islands	7
australis (Hutton) G. M. Thomson 1879	New Zealand: from Napier on the east coast of North Island to Stewart Island	Within the 20-fathoms line
bidentatus (de Haan) 1849	Japan: Nagasaki	
bispinosus Hailstone and Westwood 1835	N. E. Atlantic, from the Lofoten Islands, North of the Arctic Circle, to the Channel	10—200
	Azores	
brevirostris S. I. Smith 1881	East coast of the United States	7—233
candidus Kemp 1916	Port Blair, Andamans	
carinicauda (Stimps.) 1860	Hong Kong	
Challengeri Ortm. 1893	North West of the Cape Verde Islands	2721
	Tristan da Cunha	1080
	Near the Philippine Islands	2150
	Near Torres Strait	1400
	New Zealand, off Cape Turnagain	1100
Chiltoni Kemp 1911	New Zealand	
echinulatus (M. Sars) 1861	West and south coast of Norway	43—218
	North Sea	
	Shetland Islands; Hebrides	
	West coast of Scotland	
	East and west coast of Ireland	72—480
	Northside of the Bay of Biscay	240, 246
fasciatus (Risso) 1816	Mediterranean, Adriatic	20—30
	Azores; Arcachon; off Guernsey; Scilly Islands; Fal-	

SPECIES	HABITAT	DEPTH IN FATHOMS
	mouth; Salcombe Bay, Devonshire; Norfolk; off the Northumberland coast; Firth of Forth; Firth of Clyde; coasts of Ireland. Bergen (Norway)	Off the Irish coast not more than 15
Flindersi Fulton and Grant 1902	Western Port, Victoria	4
gracilis S. I. Smith 1882.	East coast of the United States	225, 458
	Off Table Mountain, S. Africa	250
	Andaman Sea and off the Andaman coast of the Bay of Bengal	265, 561, 583
	Hawaiian Islands	286—1059
Hendersoni Kemp 1915.	Chilka Lake	
	Puri, Orissa coast	4—4½
incisus Kemp 1916	Andamans	20
	Port Blair, Andamans	2—12
	Reef of Batjulmati (Java)	
	Madura-bay	30—50
	Anchorage off Lirung, Salibabu-island	20
	Banda	5—20
	Saleh-bay	Up to 20
intermedius (Bate) 1863.	Gulf of St. Vincent, Australia	
japonicus Dofl. 1902.	Sagami Bay, Japan	
	Sulu Sea	285
	North of Sulu Island	150
junceus Bate 1888.	Between the Philippines and Borneo	250
Kempii de Man 1918.	Between the islands of Saleyer and Tanah Djampeah	164—218
Lowisi Kemp 1916	Port Blair, Andamans	3—12
megalocheir (Stebbing) 1915 . . .	Near East London	25, 37
modestus de Man 1918	West of Kei-islands	166
modumanuensis Rathb. 1906 . . .	Hawaiian Islands	293 to 800
	Pulu Kaniungan Ketjil	6
	South-east of Rotti island	284
[1]) *neglectus* (G. O. Sars) 1882. . .	South and west coast of Norway	2—6
	Shetlands; Loch Tarbert; Firth of Clyde; Firth of Forth	8—10
	Off the south coast of Co. Wexford	40
	South coast of Iceland	20—45
	North side of the Bay of Biscay	75
norvegicus (M. Sars) 1861	East Finmark. Spitzbergen. Iceland	
	West coast of Norway	To 500
	South coast of Norway	30—220
	Skagerrak	320
	Off the west and south-west coasts of Ireland	199—775
	Bay of Biscay	
	Greenland. Davis Straits	
	Off the east coast of the United States from Nova Scotia to Long Island	105—524
obliquus Fulton and Grant 1902	Western Port, Victoria	5
occidentalis Faxon 1893	Gulf of Panama	978—1793
	Off Galera Point	1573
	Between Galapagos Islands and Acapulco	1360, 1879, 2232

1) This species is regarded by S. KEMP 1910 as a variety of *Pont. bispinosus* Hailstone and Westwood.

SPECIES	HABITAT	DEPTH IN FATHOMS
occidentalis Faxon var. *indica* de Man 1918	Flores Sea	434
	Northern part of the Strait of Makassar	711
	Ceram Sea	450
	East of Saleyer Island	933
	South of Rotti island	501
	Bali Sea	204
parvirostris Kemp 1916	Kilakarai, Ramnad distr., S. India	
[1]) *Pattersonii* (Kinahan) 1859. . .	Belfast. Shetlands	
pilosus Kemp 1916	Kilakarai, Ramnad distr., S. India	
plebs Kemp 1916	Port Blair, Andamans	2
profundus Bate 1888	Off Sydney	2000
sabsechota Kemp 1911	Port Blair, Andamans	6
sculptus (Bell) 1853	Moray Firth; the Minch	
	Firth of Clyde	5—20
	Coasts of Ireland	4½—82
	Coasts of Devon and Cornwall	
	Guernsey. Concarneau	
	Adriatic	
spinosus (Leach) 1815.	West and south coasts of Norway from Christianssund southward	30—60
	Eastern Kattegat	22—55
	Shetland Isles; Hebrides	
	South of Iceland	114—173
	Off the scotch and english coasts	20—60
	Off the east coast of Ireland	10—73
	Off the west coast of Ireland	244
	Channel Islands	
	Bay of Gascony	45, 220
	Gulf of Marseilles	38—43
	Adriatic	56—653
	Western Mediterranean	218—850
	Eastern Mediterranean	
trispinosus Hailstone 1835	Shetlands	
	North Sea	10—22
	East and west coast of Scotland	
	The Channel (Hastings, Weymouth)	
	East and west coast of Ireland	4½—17
	Concarneau	
	Cap Breton, Bay of Gascony	28
	Azores	
	Gulf of Marseilles	3—4
victoriensis Fulton and Grant 1902	Port Phillip, Victoria	5

IV. Genus **Aegeon** (Risso) Guér. Ménev. (1816) 1835.

andamanensis (W.-Mas.) 1891 . .	Andaman Sea	173, 185, 188—220
bengalensis (W.-Mas.) 1891	Bay of Bengal	145—250, 240—270, 272

1) This species has not been mentioned by STANLEY KEMP in his work: "The Decapoda Natantia of the coasts of Ireland. 1910"

SPECIES	HABITAT	DEPTH IN FATHOMS
cataphracta (Olivi) 1792	Mediterranean, Adriatic	110—165, 20—30
	Goree Island, Senegambia	
	Near East London, S. Africa	4[illegible]
	26 mi. W. S. W. of Honawar, N. Kanara district, Bombay Pres.	2[illegible]
	Karachi	
	Ceylon Pearl Banks	
	7 miles East of North Cape, New Zealand	7[illegible]
Haberi (Doflein) 1902	Sagami Bay, Japan	82
	Dzushi, Japan	71
	Between Ito and Hatsushima, Japan	82
	Hawaiian Islands	127—138
Lacazei (Gourret) 1887	Gulf of Marseilles	38—44
	Bay of Biscay	240—246
	Southwest of Ireland	160—374
orientalis Hend. 1893	Persian Gulf	48—49
	Gulf of Martaban	
	Port Blair, Andamans	
pennata (Bate) 1888.	Lobetobi Strait	135
	Saleh Bay, Sumbawa	15[illegible]
	Arafura Sea	49
	Near Enoshima, Japan	44
	Dzushi, Japan	27—55
	Sagami Bay, Japan	82
pennata (Bate) var. *affinis* Alcock 1901	Red Sea	110—493
	Persian Gulf	35, 4[illegible]
	Off Bombay	50—58
	Arabian Sea	35
	Off the coast of Burma, Bengal and Madras	12—93
propensalata (Bate) 1888	Off the Kei-islands	14[illegible]
	Botany Bay, near Sydney	5[illegible]
	Andaman Sea	55, [illegible]
propensalata (Bate) var. *hilarula* de Man 1918	Bay of Bima	3[illegible]
Rathbuni de Man 1918.	Hawaiian Islands	280—8[illegible]
	Pulu Kaniungan Ketjil	[illegible]
rugulosa Borr. 1915.	Haddumati Atoll, Maldives	
Sibogae de Man 1918.	Bali Sea	55
Sibogae de Man var. *intermedia* de Man 1918	Strait between the islands of Rotti and Timor	118

V. Genus **Argis** Kröyer 1842.

alaskensis (Kingsley) 1882	From Bering Sea, near the Pribilof Islands, to Oregon, including Puget Sound	24—121
californiensis (Rathb.) 1902 . . .	Off Santa Catalina Island, Cal.	50, 8[illegible]
	Off Santa Cruz Island, Cal.	155
crassa (Rathb.) 1899	Bering Sea and Aleutian Islands	11[illegible]—55
	Aleutian Islands to Sitka	5—[illegible]

SPECIES	HABITAT	DEPTH IN FATHOMS
	Alaska	
	Bering Island	
[illegible] (Rathb.) 1902.	From Bering Sea southward to Aleutian Islands and Alaska Peninsula	21—93
	Aleutian Islands eastward to Sitka Harbor	6—80
	Southeast coast of Kamchatka	96
	Plover Bay, Siberia	10—25
	Atlantic coast of North America from Greenland to Nova Scotia	6—96
lar (Owen) 1839.	Arctic coast of Alaska (Cape Smith) and Siberia southward to Sitka and Kurile Islands	Beach to 47
	East, southern and west coast of Greenland	Down to 120
	Okhotsk Sea, southward to Robben Island (off Cape Patience) and Iturup Island	
levior (Rathb.) 1902.	Aleutian Islands	20—42
	Semidy Islands	12—28
	Western side of Middleton Island	10—12
	Puget Sound	40
	Off Cape Beale, Vancouver Island	34
rufa Rathb. 1902	Bering Sea, from 57° 39′ N. to Aleutian Islands and Alaska Peninsula as far as Kadiak	

VI. Genus **Sabinea** Owen 1835.

hystrix (A. M.-Edw.) 1881. . . .	Off Guadeloupe	734
	Off the east coast of the United States	353—858
	Davis Straits	393. 420
	South-west of Iceland	1912
indica de Man 1918.	North of Tanah Djampeah Island	From 210
Sarsii S. I. Smith 1879	Shetland Islands	
	Skager Rak, north of the Skaw	70
	Off the south coast of Norway	60—80
	Off the west coast of Norway	
	East Finmark; western part of the coasts of the Murman Sea as far as the entrance to the White Sea	40—175
	South of Halifax	
	Gulf of Maine	60—183
	Davis Straits	67—140
	All round Iceland	50—330
	Near the Faeroes	255, 388
septemcarinata (Sabine) 1824. . .	Siberian Polar Sea from 170° 17′ E. westward to the Kara Sea	9—33
	Kara Sea	10—100
	Spitzbergen	5—183
	Barents Sea	
	Murman Sea, White Sea	16—46
	Eastern and western coasts of Finmark	
	Lofotes and further south on the west coast of Norway	
	East coast of North America from Massachusetts Bay to the St. Lawrence estuary	15—70

SPECIES	HABITAT	DEPTH IN FATHOMS
	West coast of Greenland as far up as Discovery Bay	
	at Grinnell Land	5—45
	Melville Bay	100
	South and East Greenland	0—164
	Near Jan Mayen	50—60
	Along the east, north and northwest coast of Iceland	20—110
	VII. Genus **Vercoia** Baker 1904.	
gibbosa Baker 1904	South Australia	20—30
	VIII. Genus **Coralliocrangon** Nobili 1904.	
Perrieri Nobili 1904	Djibouti	
	IX. Genus **Naushonia** Kingsley 1897.	
crangonoides Kingsley 1897 . . .	Island of Naushon, southern coast of Massachusetts	In the sand of the small channels – the so-called gutters – of the island.
	X. Genus **Prionocrangon** W.-Mas. 1891.	
Dofleini Balss 1913	Sagami Bay, Japan	191—328
ommatosteres W.-Mas. 1891 . . .	Bay of Bengal off the Ceylon coast	200—350
	Andaman Sea	405
	East of Saleyer Island	633
	Northern part of the Strait of Makassar	711
pectinata Faxon 1896.	Off Martinique	565
	XI. Genus **Paracrangon** Dana 1852.	
areolata Faxon 1893	Near Las Tres Marias	676, 680
echinata Dana 1852.	From Port Etches, Alaska, to Puget Sound	12—48
	North-east of Yedo Island	
	Sagami Bay, Japan	190—765
	Wladiwostok	
	Tartarian Gulf	
	Southern Okhotsk Sea	

Pontophilus Leach.

Among the genera of Crangonidae it is the genus *Pontophilus* Leach which nowadays is represented by the largest number of species: no less than 38 species and 1 variety, indeed, are at present known. Species of *Pontophilus* are recorded from various parts of the world: excepting *Pont. norvegicus*, however, this genus has not been observed in the Arctic Ocean, on the north coast of Russia, Asia, Alaska etc., nor are species known from the antarctic seas at a greater latitude than 50° S. *Pont. spinosus* and *fasciatus* have repeatedly been found in the Adriatic and the Mediterranean, *Pont. sculptus* has been recorded from the Adriatic, while *Pont. trispinosus* has been taken off Marseilles, so that in these seas the genus is apparently represented by four species. *Pont. norvegicus* ranges from East Finmark, Spitzbergen and

Iceland to the Bay of Biscay, but has also been captured off Greenland, in Davis Straits and off the east coast of North America to Long Island. The north-eastern Atlantic, the coasts of Europe, are inhabited, besides by *Pont. norvegicus*, by eight species, *Pont. bispinosus*, *echinulatus*, *fasciatus*, *neglectus*, *Pattersonii*, *sculptus*, *spinosus* and *trispinosus:* excepting *Pont. norvegicus*, *Pattersonii* and *sculptus*, these species occur all in the North Sea. *Pont. Challengeri* Ortm. is one of the most widely distributed forms, it was taken by the "Challenger" north west of the Cape Verde Islands, off Tristan da Cunha, near the Philippine Islands, near Torres Strait and off Cape Turnagain, New Zealand. Three species are known from the east coast of the United States, *Pont. abyssi*, *brevirostris* and *gracilis*, of which the first and the third have also been observed in the Bay of Bengal, *Pont. gracilis*, moreover, also off Table Mountain, South Africa and at the Hawaiian Islands. Still another species is known from South Africa, *Pont. megalocheir*, which is remarkable by the great size of the hand and finger of the first peraeopods and which was captured near East London, South Africa.

No species of this genus are known from the West-Indies or from the east coast of South America, while *Pont. occidentalis* Faxon is the only representative on the west coast of America, occurring in the Gulf of Panama, off Galera Point and between the Galapagos Islands and Acapulco.

The greater part of the species of this genus are found in the Indopacific. Besides *Pont. abyssi* and *gracilis*, eight are known from the Bay of Bengal, the Andaman Sea and the east coast of India, namely: *Pont. candidus*, *Hendersoni*, *incisus*, *Lowisii*, *parvirostris*, *pilosus*, *plebs* and *sabsechota:* these species, with which Mr. Stanley Kemp has lately enriched science, are all of a small size, *Pont. sabsechota*, only 9,3 mm. long, being one of the smallest Macrura known.

Thanks to the investigations of the "Siboga" we are at present acquainted with nine species found in the Indian Archipelago. Besides *Pont. Challengeri* they are *Pont. angustirostris*, *incisus*, *japonicus*, *junceus*, *Kempii*, *modestus*, *modumanuensis* and a new variety *indica* of *Pont. occidentalis: Pont. angustirostris*, *Kempii* and *modestus* proved to be new to science. Of these species *Pont. incisus* occurs also at the Andamans, while *Pont. modumanuensis* was first recorded from the Hawaiian Islands, which, as already indicated, are also inhabited by *Pont. gracilis*; *Pont. japonicus* was first made known from Japan, where still another species occurs, *Pont. bidentatus*. *Pont. carinicauda*, allied to *Pont. japonicus*, is only known from Hong Kong. Five interesting forms occur on the coast of New South Wales, Victoria and South Australia, viz. *Pont. Flindersi*, *intermedius*, *obliquus*, *profundus* and *victoriensis:* they are confined to these coasts and not found elsewhere. *Pont. intermedius* from the Gulf of St. Vincent bears some resemblance to *Pont. Pattersonii* from Belfast, a form which is as rare and as little known. The coasts of New Zealand, finally, are inhabited by three, firstly the already mentioned *Pont. Challengeri* and furthermore *Pont. australis* and *Chiltoni*, that are closely related.

As regards the vertical distribution the List of the species teaches that the greater number occur in shallow water or at moderate depths, while only five have been captured at a greater depth than 1000 fathoms. These five, *Pont. abyssi*, *Challengeri*, *gracilis*, *occidentalis* and *profundus*, are closely allied forms, as is proved by the key to the species and the first three belong to those that are very widely distributed. Nearly one-third of all the species have been taken at less than 100 fathoms and about one-fourth at less than 25, namely *Pont. australis*,

Flindersi, *Hendersoni*, *incisus*, *Lowisii*, *obliquus*, *plebs*, *sabsechota* and *victoriensis*. The depth at which the same species occurs, varies also often considerably, *Pont. Challengeri*, for instance, was trawled at 1100, but also at 2150 fathoms, *Pont. occidentalis* at 978 and at 2232, *Pont. echinulatus* at 43 and 480.

Key to the species of the genus *Pontophilus* Leach.

a_1 Outer margin of antennal scale not denticulated.

b_1 First four abdominal somites dorsally smooth.

c_1 Three spines on mid-dorsal line of carapace.

d_1 Carapace with four lateral spines, which, like the three of the mid-dorsal line, are not the acute endings of carinae. Rostrum with the lateral margins unarmed and tapering to a narrow rounded apex . . . . . *pilosus* Kemp

(Stanley Kemp, Records Indian Museum, Calcutta, Vol. XII, Part VIII, 1916, p. 367, Pl. VIII, fig. 4.)

d_2 Carapace with two lateral keels, the upper with two spines, the lower with one.

c_1 Rostrum long and narrow, projecting beyond the line of the spiniform outer angles of the orbits, terminating in an acute point and armed about in the middle with a pair of small lateral spinules . . . . . *norvegicus* (M. Sars)

(Stanley Kemp, The Decapoda Natantia of the Coasts of Ireland, Dublin 1910, p. 162, Pl. XXI, figs. 9, *a* and *b*.)

c_2 Rostrum very short, tridentate, the median tooth scarcely broader and very little longer than the lateral, not projecting beyond the line of the spiniform outer angles of the orbits . . . . . *brevirostris* S. I. Smith

(S. I. Smith, Bull. Mus. Comp. Zoology, Cambridge, Vol. X, N° 1, 1882, p. 35, Pl. VII, figs. 1—1*b*.)

d_3 Carapace with two lateral spines.

c_1 Peraeopods of the first pair with the outer margin of the merus unarmed.

Rostrum with two pairs of lateral teeth.

f_1 Eyes small, the length of carapace, including the rostrum, being about ten times as long as their greatest diameter *abyssi* S. I. Smith

(S. I. Smith, Annual Report Commiss. of Fish and Fisheries for 1882. Wash. 1884, p. 363 (19); idem for 1885, Wash. 1886, Pl. XI, figs. 3, 3*a*.)

f_2 Eyes large, the length of carapace, including the rostrum, being 5,1—5,8-times as long as their greatest diameter.

g_1 Species 73 mm. long. Abdomen $2^1/_2$-times as long as carapace. Anterior gastric spine as large as posterior *occidentalis* Faxon

(W. Faxon, in: Memoirs Museum Comp. Zoology, Cambridge, Vol. XVIII, 1895, p. 131, Pl. D, fig. 2—2*d*.)

g_2 Species not exceeding 48 mm. in length. Abdomen 3-times as long as carapace. Anterior gastric spine considerably smaller than posterior. . . . *occidentalis* Faxon var. *indica* de Man

e_2 Peraeopods of the first pair with the outer margin of the merus armed with a spine . . . . . *Challengeri* Ortm.

(*Pontophilus gracilis* C. Spence Bate, Report Challenger Macrura, 1888, p. 487, Pl. 87; *Pontophilus challengeri* A. Ortmann, Decapoden und Schizopoden der Plankton-Expedition, Bd. II. G. b., Kiel und Leipzig, 1893, p. 49.)

d_1 On either side of the mid-dorsal line a row of minute spines terminating in one principal tooth. One spine on each hepatic region. Rostrum short, rounded at apex, narrowed, concave above . . . . . *Pattersonii* (Kinahan)

(J. R. Kinahan, Proc. Royal Irish Acad. Vol. VIII, Part 1. Dublin 1862, p. 4, 8. Pl. V.)

c_2 Mid-dorsal line of carapace with two spines.

d_1 Carapace with six lateral spines.

e_1 Mid-dorsal spines of carapace placed close together on the anterior third. Antennal scale a trifle more than twice as long as wide . . . . . *australis* (Hutton) G. M. Thomson

(G. M. Thomson, On the New Zealand Phyllobranchiate Crustacea-Macrura. London 1903, p. 434, Pl. 27, figs. 1—5.)

e_2 Mid-dorsal spines of carapace widely separate, posterior spine placed exactly on the middle of the carapace. Antennal scale considerably less than twice as long as wide . . . . . *Chiltoni* Kemp

(Stanley Kemp, Records Indian Museum, Vol. VI, Part 1, Calcutta 1911, p. 5, Pl. II, figs. 6—10.)

d_2 Carapace with three lateral spines: two are placed on the first or upper one of the three lateral keels, the third spine on the lower, while the second or middle keel is unarmed. Rostrum truncate. . . . . *bidentatus* (de Haan)

(W. de Haan, Fauna Japonica. Crustacea, 1849, p. 183, Pl. XLV, fig. 14.)

d_3 Carapace with two lateral spines.

Rostrum acute, slender.

e_1 Rostrum without lateral teeth . . . . . *junceus* Bate

(C. Spence Bate, l. c., p. 491, Pl. 88, figs. 2—4.)

e_2 Rostrum with one lateral tooth on each side. Spines of the lateral faces of carapace in an oblique plane . . *gracilis* S. I. Smith

(S. I. Smith, l. c., 1882, p. 36, Pl. VII, figs. 2—3*a*.)

e_3 Rostrum with two lateral teeth on each side. Spines of the lateral faces of carapace in the same level . . . *profundus* Bate

(C. Spence Bate, l. c., 1888, p. 490, Pl. 88, fig. 1.)

d_4 Carapace with one spine on each side.

c_1 Carapace subquadrate, as broad as long.
Rostrum broad, flattened, obscurely trifid at the apex. Lateral spine of carapace turned obliquely inward . . *obliquus* Fulton and Grant
(S. W. Fulton and F. E. Grant, Proc. Roy. Soc. Victoria, Vol. XV (New Series), Pt. 1, 1902, p. 63, Pl. X, fig. 1.)

c_2 Carapace much longer than broad.
Rostrum acute, armed on the basal half with two spines on each side. Lateral spine of carapace directed straightly forwards . . . . . *modumanuensis* Rathb.

d_3 Carapace without lateral spines.
On either side of the carapace are numerous minute tubercles arranged in more or less distinct longitudinal series . *bispinosus* Hailstone and Westwood
(Stanley Kemp, l. c., 1910, p. 152, Pl. XXI, figs. 4, *a* and *b*.)

c_3 Mid-dorsal line of carapace with one spine [1]).

d_1 Carapace with four lateral spines, one a little behind the level of the mid-dorsal spine and three, behind one another, just posterior to the antero-lateral spine. A curved ridge behind the eyes is cut into four small fine teeth *Flindersi* Fulton and Grant
(S. W. Fulton and F. E. Grant, l. c., p. 67, Pl. X, fig. 3.)

d_2 Carapace with three lateral spines.

e_1 Of the three lateral spines the two lower ones are placed close together, the posterior much farther distant from the third or hepatic spine as from the anterior. Laminar portion of antennal scale exceeding far the terminal spine *plebs* Kemp
(Stanley Kemp, l. c., 1916, p. 370, Pl. VIII, fig. 5.)

e_2 Of the three lateral spines the two lower are not placed close together, the posterior being as far distant from the hepatic spine as from the anterior. Laminar portion of antennal scale not or hardly exceeding the terminal spine . . . . . *modestus* de Man

d_3 Carapace with two lateral spines.

e_1 Between the two lateral spines and the mid-dorsal line is a row of minute denticles extending from the orbital spine backward to just beyond the middle of carapace *intermedius* (Bate)
(C. Spence Bate, Proc. Zool. Society, London, 1863, p. 6, Pl. XLI, fig. 6.)

e_2 No row of minute denticles between the mid-dorsal line and the lateral spines of the carapace.

f_1 Terminal spine of antennal scale not reaching nearly as far forward as the distal end of the lamella. Sixth abdominal somite about twice as long as thick . . *candidus* Kemp ♂
(Stanley Kemp, l. c., 1916, p. 365, textfigure 3.)

1) In *Pont. neglectus* sometimes behind this spine an obscure tubercle is observed in the mid-dorsal line.

f_2 Terminal spine of antennal scale reaching nearly as far forward as the distal end of the lamella. Sixth abdominal somite almost four times as long as thick . . *modestus* de Man

d_1 Carapace with one spine on each side . . . . . *trispinosus* Hailstone

(Stanley Kemp, l. c., 1910, p. 146, Pl. XXI, figs. 2, *a* and *b*.)

d_2 Carapace without lateral spines.

c_1 Carapace longer than broad.

f_1 On either side of the mid-dorsal line of the carapace are two lobe-like folds, that anteriorly are well-defined and rounded. Rostrum very broad, abruptly truncate at apex . . . . . *fasciatus* (Risso)

(Stanley Kemp, l. c., 1910, p. 151, Pl. XXI, figs. 3, *a* and *b*.)

f_2 Carapace without lobe-like folds on either side of the middle line. Rostrum rather narrow with rounded apex *neglectus* (G. O. Sars)

(Stanley Kemp, l. c., 1910, p. 153, Pl. XXI, figs. 5, *a* and *b*.)

c_2 Carapace broader than long. Immobile finger of subchela formed of two teeth, closely juxtaposed and not articulated.

f_1 Telson furnished at the apex with a long and slender tooth, flanked by a pair of plumose setae . . . . *megalocheir* (Stebbing)

(Th. R. R. Stebbing, Annals South African Museum, XV, London, 1915, p. 71, Pl. LXXIX.)

f_2 The apex of the telson consists of a triangular plate with a minute spinule on either side and with two pairs of plumose setae arising from beneath it . . *Hendersoni* Kemp

(Stanley Kemp, Memoirs Indian Mus., V, 1915, p. 261, Pl. XIII, fig. 8.)

c_4 Mid-dorsal line of carapace without spines.

d_1 Rostrum well-developed, as long as the eyes, apex broad, squarely truncate . . . . . *candidus* Kemp ♀

d_2 Rostrum exceedingly small, consisting merely of a small flat, triangular, acute prolongation of the median part of the carapace, so that the eyes are contiguous . . *parvirostris* Kemp

(Stanley Kemp, l. c., 1916, p. 372, Pl. VIII, fig. 6.)

b_2 Abdomen with at least the third and following somites carinated.

c_1 Carapace with no spine in the mid-dorsal line. Three lateral keels, of which the first and the third are unispinose . *carinicauda* (Stimps.)

(W. Stimpson, Proc. Acad. Nat. Sciences Philadelphia, 1860, p. 25.)

c_2 Mid-dorsal line of carapace with one spine. Three lateral keels, the first without a spine, but abruptly notched near its middle point, the second with a spine and a notch, third unarmed. . . . . *sabscchota* Kemp

(Stanley Kemp, l. c., 1911, p. 6, Pl. II, figs. 11—14.)

c_3 Mid-dorsal line of carapace with three spines.

d_1 Lateral faces of carapace with five spines, placed on two carinae, the upper bearing three spines, the lower two. *spinosus* (Leach)

(Stanley Kemp, l. c., 1910, p. 160, Pl. XXI, figs. 8, *a—d*.)

d_2 Lateral faces of carapace with more than five spines.

e_1 First lateral keel of carapace reaching to near the posterior edge; between it and the mid-dorsal line another row of very small teeth . . . . . *echinulatus* (M. Sars)

(Stanley Kemp, l. c., 1910, p. 144, Pl. XXI, figs. 7, *a—d*.)

e_2 First lateral keel reaching only about three-fourths the length of the carapace backward; no small teeth between it and the mid-dorsal line . . . . . *victoriensis* Fulton and Grant

(S. W. Fulton and F. E. Grant, l. c., p. 65, Pl. X, fig. 2.)

a_2 Outer margin of antennal scale denticulate.

At least the third and following somites of the abdomen are carinated.

b_1 Outer margin of antennal scale armed with a single spine in addition to the terminal spine.

c_1 Additional spine of outer margin of antennal scale placed near the base, at the end of the proximal quarter . . *incisus* Kemp

c_2 Additional spine of outer margin of antennal scale placed at the end of the proximal third or near the middle.

d_1 Mid-dorsal line of carapace armed with two stout spines. Of the ridges on the lateral faces of the carapace only one, the foremost of the second lateral carina, is produced anteriorly in the form of a spine . . . . . *sculptus* (Bell)

(Stanley Kemp, l. c., 1910, p. 148, Pl. XXI, figs. 6, *a* and *b*.)

d_2 Mid-dorsal line of carapace with one spine or with no spine at all.

e_1 Of the lateral carinae of the carapace the undermost ends in a spine.

Propodus of subchela of anterior legs 3,2-times as long as wide in the middle . . . . . *angustirostris* de Man

e_2 Of the lateral carinae of the carapace the undermost is unarmed.

Propodus of subchela of anterior legs 2,5-times as long as wide in the middle . . . . . *Kempii* de Man

b_2 Outer margin of antennal scale armed with a series of spinules.

c_1 Carapace carinated in the mid-dorsal line and with four lateral carinae, all sharp, prominent and partly produced in the form of a spine. . . . . *japonicus* Doflein

c_2 Carapace without spines and without lateral carinae. . *Lowisi* Kemp

(Stanley Kemp, l. c., 1916, p. 361, Pl. VIII, fig. 2.)

1. *Pontophilus occidentalis* Faxon, var. *indica* de Man. Pl. XX and XXI, Fig. 63—63*c*.

Pontophilus occidentalis Fax. var. *indica* J. G. de Man, in: Zoolog. Mededeelingen, uitgegeven vanwege 's Rijks Museum van Natuurlijke Historie te Leiden, 1918, Deel IV, Afl. 3, p. 161.
Confer: *Pontophilus occidentalis* W. Faxon: in: Memoirs Museum Comp. Zoology, Vol. XVIII, Cambridge 1895, p. 131, Pl. D, fig. 2—2*d*.

Stat. 45. April 6. 7° 24′ S., 118° 15′.2 E. Flores Sea. 794 m. Bottom fine grey mud, with some radiolariae and diatomes. 1 young and 2 adult ova-bearing females.
Stat. 88. June 20. 0° 34′.6 N., 119° 8′.5 E. Northern part of the Strait of Makassar. 1301 m. Bottom fine grey mud. 2 females.
Stat. 178. Sept. 2. 2° 40′ S., 128° 37′.5 E. Ceram Sea. 835 m. Bottom blue mud. 1 young female.
Stat. 211. Sept. 25. 5° 40′.7 S., 120° 45′.5 E. East of Saleyer Island. 1158 m. Bottom coarse grey mud, superficial layer more liquid and brown. 1 young female.
Stat. 300. January 30, 1900. 10° 48′.6 S., 123° 23′.1 E. South of Rotti island. 918 m. Bottom fine, grey mud. 1 male.
Stat. 316. Febr. 19, 1900. 7° 19′.4 S., 116° 49′.5 E. Bali Sea. 538 m. Bottom fine, dark brown sandy mud. 2 young and 4 adult, egg-bearing females.

Pontophilus gracilis S. I. Smith, *abyssi* S. I. Smith, *Challengeri* Ortm., *junceus* Bate, *profundus* Bate, *occidentalis* Faxon and this new variety *indica* form together a group of very closely related species, some of which will perhaps prove after future investigations to be geographical races of one widely distributed form, as was already suggested by W. Faxon (l. c.). The 14 specimens, collected by the "Siboga", seem also to render probable this supposition, because in some details they vary rather much. Unfortunately a detailed description of *Pont. occidentalis* exists, properly speaking, not, for Faxon confined himself to indicating only the differences between his species from the Gulf of Panama and two others, *Pont. abyssi* S. I. Smith and *Challengeri* Ortm. Nevertheless the present specimens are referred to *Pont. occidentalis*, though as a new variety, which is characterized by its much smaller size and by the anterior of the two median spines on the gastric region being considerably smaller than the posterior and usually of a microscopical size.

The 6 females from Stat. 316 are considered as the typical representatives of this new variety *indica*. In the adult females from this Station the rostrum (Fig. 63*d*, 63*f*, 63*g*) is obliquely directed upward and appears straight in a lateral view, excepting in one specimen where it is distinctly curved; the rostrum, which, when looked at from above, appears as long as the eyes or but little shorter, has a rather slender form, being more than four times (4,5; 5,6; 6) as long as broad, the greatest breadth being the distance between the apices of the lateral teeth of the posterior pair. The rostrum is armed on its proximal half with two pairs of small, i. e. little prominent teeth, excepting in one ova-bearing specimen, in which on the left side 3 teeth are observed, on the right only one, the posterior, and a young female, in which the rostrum has on the left side one, on the right two teeth. In one of the two ova-bearing females from Stat. 45 the rostrum, obliquely directed upward and distinctly curved in a lateral aspect, reaches hardly beyond the middle of the eyes and has a less slender form than in the specimens from Stat. 316, the rostrum being only 3,4-times as long as broad; in the other ova-bearing specimen from Stat. 45 the rostrum (Fig. 63*h*) appears comparatively still broader, only 2,8-times as long as broad, though as long as in the former; it is here hardly turned upward, slightly curved in

a lateral view and almost contiguous to the eyes. In both females the rostrum is armed with two pairs of teeth that are larger, i. e. more prominent, than in the specimens from Stat. 316; the rostrum of the young specimen from this Station resembles that of the specimens from Stat. 316. In the four females from the Stations 88, 178 and 211, that are young or of medium size, the rostrum shows the same broad form as in the second ova-bearing specimen from Stat. 45, being less than three-times as long as broad (2,2—2,7) and it is armed with two pairs of rather large lateral teeth; as in that female the rostrum, shorter than the eyes, is hardly turned upward. The rostrum of the specimen from Stat. 300, the single male collected and 35,5 mm. long, is 3,5-times as long as wide, a little shorter than the eyes, slightly turned upward and armed with two pairs of rather large teeth. The preceding observations show that there are usually two, rarely three pairs of rostral teeth, that the rostrum, never longer, but usually shorter than the eyes, is more or less distinctly turned upward and that the general shape of the rostrum varies considerably.

Like in *Pont. abyssi* S. I. Smith and *occidentalis* Faxon the carapace is armed dorsally in the middle line with one cardiac and two gastric spines, but the anterior gastric spine is always considerably smaller than the posterior. In the specimens from the Stations 45 and 316, like also in the younger female from Stat. 88, the anterior spine (Fig. 63*c*) is hardly visible by means of an ordinary magnifying glass and may easily be overlooked, so that the microscope must be put in use; in the four remaining specimens (Fig. 63*c*) the anterior spine is a little larger, measuring about one-third the length of the posterior gastric spine. In the typical *Pont. occidentalis* from Panama, however, the two gastric spines are of the same size. In the present specimens the posterior gastric and the cardiac spine, that are equal, are a little smaller than the hepatic and the epibranchial spine; the latter are also equal and placed, like in *Pont. occidentalis*, in an oblique plane, but the hepatic spine stands just in front of the posterior gastric. Like in *Pont. gracilis* S. I. Smith (Confer Th. R. R. Stebbing, South African Crustacea, Part III, 1905, Pl. XXV, car.), the carinated lower margin of the carapace terminates anteriorly in a microscopical spinule, situated a little posterior to the post-antennal spine; this microscopical spinule, which often does not occur, being probably worn off, must apparently be considered as the branchiostegal or as the antero-lateral spine of the carapace.

Orbital and post-antennal spine well-developed, the latter slightly in advance of the eyes and usually a little turned outward. Carapace about twice as long as broad. A distinct, prominent though rounded carina runs from the posterior gastric to the cardiac spine and from the latter to near the posterior margin, gradually fading away; anteriorly the carina gradually disappears near the anterior gastric spinule. On either side of the carapace a similar, rounded carina runs parallel with the dorsal crest, beginning at some distance from the posterior margin and terminating in the epibranchial spine; the hepatic spine, however, is not buttressed by a carina. Like in *Pont. abyssi*, finally, a microscopical spinule occurs each side just back of the supraorbital fissure; hepatic groove deep, distinctly separated from the supraorbital fissure. Similarly as in the genus *Parapenaeus* a fine fissure runs horizontally and straight backward from the orbital margin, just above the orbital spine, to near the epibranchial spine, where it

disappears: I do not know whether this fissure has already been observed in other species of this genus.

The abdomen, telson included, is three times as long as the carapace, rostrum included, in *Pont. occidentalis*, however, only two and a half times, but for the rest it seems to agree with this species. The 6th somite, that measured in the full-grown female one-fifth the length of the abdomen, while in the male and the other younger specimens it is a little longer, is not yet 5-times as long as thick in the middle; its upper border is rounded or flattened, rarely, like in the male and in an ova-bearing female from Stat. 45, slightly concave.

Telson a little longer than the 6th somite, in young specimens slightly shorter than it, somewhat grooved anteriorly, flattened posteriorly, with two pairs of small spinules, of which the anterior is implanted a little behind the middle of the telson, the posterior a little farther distant from the anterior than from the tip. The acute extremity of the apex is flanked at either side by three pairs of spines, like in *Pont. gracilis* (Th. R. R. Stebbing, South African Crustacea, Part. III, 1905, p. 95, Pl. XXV); the submedian pair, by far the longest, 1,16 mm. long in the adult female, about one-seventh the length of the telson, and fringed with fine setae, the second pair a little less than half as long, the third pair at the posterior extremity of the lateral margins very short, measuring one-seventh the length of the submedian pair. The inner uropods are as long as the telson, the terminal spinules included, the outer reach only to the tip, but sometimes both the inner and the outer are a little shorter. In the male, long 35,5 mm., from Stat. 300, the spines of the submedian pair are 0,8 mm. long, one-eighth the length of the telson, those of the 2nd pair 0,48 mm., a little more than half as long, the 3rd pair, finally, 0,15 mm., almost one-fifth the length of the submedian pair.

The eyes are large, comparatively as large as those of *Pont. gracilis* S. I. Smith, and much larger than those of *Pont. abyssi*: in adult specimens, both male and female, the carapace, rostrum included, is namely 5,1—5,8-times as long as the greatest diameter of the eye, in the typical female of *Pont. gracilis* from the east coast of the United States this number is 5,6, but in *Pont. abyssi* S. I. Smith it varies from 9,4 to 10,4. In one of the two ova-bearing females from Stat. 45 the eyes are anteriorly and on the inner side of a pale straw colour, the colour of the outer side is a little darker, in the other female they are mouse-coloured, though on the inner side lighter, in the young specimen, finally, they are slate-coloured, the inner margin even blackish; in the two specimens from Stat. 88 the eyes are light leather-coloured, but in the younger one there are 2 or 3 yellow-brown spots on the outer posterior half; the young female from Stat. 178 has the same light leather-coloured eyes as those from the preceding Station. The eyes of the young female from Stat. 211 present a different colouration, the anterior half is of a light, almost milky, sea-green, the posterior is much darker, greenish. Of the male from Stat. 300 the eyes are of a uniform, light leather colour; the specimens from Stat. 316, however, are of a darker colour than the preceding, the drab colour of a hazelnut, with the inner margin blackish; in one ova-bearing female the right eye is marked posteriorly on the outer side with two small brown spots, while of the left the posterior half is brown. When these observations are compared with the depths, at which the specimens were

obtained, we come to the remarkable conclusion that at smaller depths the eyes show generally a darker colour than in deeper water.

The antennular peduncle reaches not yet to the middle of the antennal scale; the 2nd joint appears in the female almost twice as long as thick and twice as long as the 3rd, in the male, however, the 2nd joint is slightly broader than long and hardly longer than the 3rd; stylocerite acuminate, as long as basal article. The thin inner flagellum of the male, 6 mm. long, measures about three-fourths the length of the carapace, rostrum included; the outer flagellum is a little shorter, but considerably broader, the basal joint, nearly as long as the 2nd and 3rd joint of the peduncle taken together, is about twice as long as broad, the following are much broader than long, while the last joints become gradually longer than broad; in the adult female the inner flagellum is hardly more than half as long as the carapace, rostrum included, but the slightly shorter outer flagellum is not thicker or broader than the inner.

Antennal scale (Fig. 63*i*) resembling that of *Pont. gracilis*, a little more than half as long as the carapace and 3,5-times as long as broad in the middle; the slender terminal spine of the slightly concave, unarmed, outer margin reaches about as far forward as the rounded apex. In all the specimens from the Stations 45, 211, 316 and in the larger specimen from Stat. 88 the scaphocerite appears a little shorter than the distance between the apex of the rostrum and the cardiac spine, in the smaller specimen from Stat. 88 and in the specimens from the Stations 178 and 300 it is a little longer than that distance.

The external maxillipeds reach in the adult female by half their terminal joint beyond the antennal scale, in the male from Stat. 300 they are incomplete; terminal joint, in the female, nearly as long as the penultimate, not longer.

The 1st pair of peraeopods (Fig. 63*j*), that bear a rudimentary exopodite, project in the female by one-fourth the propodus beyond the antennal scale, in the male they hardly reach beyond it. Merus with a small spine at the far end of the upper border; carpus with a minute spine at the upper end of the distal outer margin and with a much larger at the lower end, a third spine, smaller than the last one, exists at the inner side of the distal margin inferiorly. Propodus a little more than 4-times as long as broad in the middle.

The peraeopods of the 2nd pair (Fig. 63*k*, 63*l*) reach to the middle or hardly beyond the middle of the merus of the anterior legs. The chela is 2,5—2,7-times as long as the carpus, which is distinctly shorter than the palm and the chela appears about 6-times as long as broad at the articulation of the dactylus; like in *Pont. gracilis*, the fingers, which are as long as the palm, are gaping, the dactylus being distinctly curved; the single unguis, in which the immobile finger terminates, measures $^3/_8$ the entire length of this finger, while the two equal ungues of the dactylus are much shorter, measuring $^1/_4$ or $^1/_5$ of its whole length. As regards the setae, implanted on this leg, it resembles *Pont. gracilis* (Th. R. R. Stebbing, l. c.).

When fully pronated, in the adult female, the two last joints of the filiform legs of the 3rd pair and even one-fourth or one-fifth of the carpus reach beyond the antennal scale (in the male these legs are incomplete).

The stoutish peraeopods of the 4th and 5th pair are nearly of equal length, reaching by the whole length of the vertically-compressed dactyli beyond the tip of the antennal scale; those

of the 4th pair are, however, distinctly stouter than those of the 5th. Of one of the two full-grown females from Stat. 45 the measurements of the three last joints of these legs (Fig. 63*m*, 63*n*) are the following: of the 4th pair carpus 3 mm., propodus 4,2 mm., dactylus 3 mm., of the 5th pair carpus 4 mm., propodus 5 mm., dactylus 3,1 mm. These numbers show that the dactyli of the 4th pair are as long as the carpus, of the 5th slightly shorter than it, while the carpus of the 4th pair is one-fourth shorter than that of the 5th.

Like in *Pont. occidentalis*, one observes both in the male and in the female a small sharp spine between the peraeopods of the second pair.

The pleopods of the male from Stat. 300 resemble those of the male of *Pont. gracilis* (S. I. Smith, Bull. Mus. Comp. Zool. Vol. X, N° 1, 1882, p. 38, Pl. VII, figs. 3 and 3*a*). Of the 1st pleopod of the male (Fig. 63*o*, 63*p*, 63*q*) the outer ramus which is 2,45 mm. long, is 3,4-times as long as broad and fringed on both margins with plumose setae; the inner ramus measures three-sevenths the length of the outer and is 4-times as long as broad; the truncate tip of the inner ramus is notched, so that the inner part of the tip projects slightly as a lobe armed with 4 cincinnuli, the outer margin is glabrous, but the inner bears along its distal half 8 or 9 very short setae, that become slightly longer backward, while the proximal half is sinuated. Of the 2nd pleopod of the male (Fig. 63*r*, 63*s*, 63*t*) the inner ramus is but little shorter than the outer, the distance between their tips being only one-eighth the length of the outer ramus; the styliform appendix interna is 0,85 mm. long, a little more than one-third the length of the inner ramus, it is 10-times as long as thick, glabrous and bears a large number of cincinnuli at the tip; appendix masculina half as long as the stylamblys, but thicker, glabrous, except 2 or 3 short setae on the tip. The pleopods of the 3rd, 4th and 5th pair agree with those of the 2nd, except of course the absence of the appendix masculina.

Of the adult ova-bearing female the inner ramus of the 1st pleopod (Fig. 63*u*) measures four-fifths the length of the outer; it is narrow, nearly 10-times as long as broad and fringed on both margins with long feathered setae, that are also implanted on the tip. Of the 2nd pleopod (Fig. 63*v*) both rami show the same length, but the inner is less broad, the proportion of the width in the middle being like 5 : 7; stylamblys half as long as the rami, a little thicker than in the male, 8-times as long as thick, fringed with long, feathered setae on the outer margin, excepting the distal fifth, and on the distal fifth of the inner; cincinnuli on the tip. Pleopods of the following pairs like the second.

Eggs very numerous, small, 0,6—0,7 mm. long.

Male long 35,5 mm., female 48 mm.

Pontophilus occidentalis Faxon from the Gulf of Panama differs from the present specimens by its much larger size, this species attaining the length of 73 mm., furthermore by the shorter abdomen; the abdomen, indeed, 52 mm. long, appears in the american species only $2^1/_2$-times, in the variety *indica*, however, 3-times as long as the carapace, rostrum included; a third difference, finally, is caused by the anterior gastric spine being of the same size as the posterior.

The variety *indica* is, however, also closely allied to *Pont. gracilis* S. I. Smith and should perhaps be considered with more right as a variety of this species, in which the abdomen

is also 3-times as long as the carapace, especially because *Pont. gracilis* will perhaps prove to possess also a microscopical, anterior, gastric spine, hitherto overlooked. *Pont. gracilis* differs by the rostrum being only armed with one pair of marginal spines and probably by different measurements of the 2nd peraeopods, according to STEBBING's quoted paper of 1905, on the plate of which the chela of the anterior legs presents also a stouter shape.

Table of Measurements in millimeters.

Table A.

	1	2	3	4
Length from tip of rostrum to tip of telson	48	45	26,5	35,5
Length of carapace, including rostrum	11,7	11,2	7	8,6
Length of rostrum [1]	1,7	2,22	1,24	1,4
Breadth of rostrum [2]	0,5	0,4	0,28	0,4
Width of carapace at the level of the post-antennal spines	5,8	5,7	3,4	4,45
Greatest width of carapace	6,2	5,8	3,75	4,6
Greatest diameter of eye	2,2	2	1,4	1,6
Length of antennal scale	7	6,2	4	5,3
Breadth of antennal scale	1,75	1,6	1	1,32
Length of first peraeopod, dactylus excluded	17	15,5	10	12,5
Length of propodus of this leg	7,2	6,5	4,2	5,5
Width of propodus midway between the proximal and distal extremity	1,6	1,5	0,95	1,25
Length of second peraeopod	7	6,5	4,1	5,1
Length of carpus of this leg	0,6	0,6	0,4	0,5
Length of chela	1,6	1,52	1	1,2
Breadth of chela	0,28	0,24	0,18	0,22
Length of dactylus	0,8	0,76	0,5	0,62
Length of abdomen	37,3	33,8	22,5	27
Length of sixth somite	7	6,75	5	6
Breadth of sixth somite in the middle	1,6	1,6	1,1	1,3
Length of telson [3]	8,75	7,7	4,6	6,5
Length of inner uropod [4]	8,5	8,5	5	6,75
Length of outer uropod [4]	8,3	7,75	4,6	6,25
Distance, in the middle line, between tip of rostrum and tip of gastric spine	7,25	7	4,1	5,15

N° 1 ova-bearing female from Stat. 45; N° 2 ova-bearing and N° 3 young female from Stat. 316; N° 4 male from Stat. 300.

Table B.

	1	2	3	4	5	6	7	8	9	10				
Length of carapace, rostrum included	11,6	11,6	7,5	10,5	7,4	6,5	8,3	8,6	11,5	11,2	10,3	10	7,1	7
Length of rostrum	1,7	1,7	1,5	1,5	1,1	1,1	1,15	1,4	2	2,22	2,1	2,12	1,44	1,24
Breadth of rostrum	0,5	0,6	0,34	0,6	0,48	0,4	0,52	0,4	0,44	0,4	0,35	0,38	0,31	0,28
Greatest diameter of eye	2	2	1,36	1,8	1,5	1,16	1,25	1,6	2	2	2	1,75	1,4	1,4
Proportion between the length of carapace and the greatest diameter of eye	5,8	5,8	5,5	5,8	5	5,6	6,6	5,4	5,7	5,6	5,1	5,7	5,3	5
Proportion between length and breadth of rostrum	3,4	2,8	4,4	2,5	2,3	2,7	2,2	3,5	4,5	5,6	5	5,6	4,6	4,4

1) The rostrum, being directed more or less obliquely upward, is measured in a horizontal position, when the carapace has been placed obliquely.

2) The breadth of the rostrum is the distance between the apices of the posterior pair of teeth.

3) The length is taken from the base to the tip, in the middle line, without the terminal spines.

4) The two uropods are measured from the articulation with the 6th somite, the basal joint being included.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Proportion between the length of the rostrum and that of the rest of the carapace	5,8	5,8	4	6	5,7	5	6,2	5,1	4,7	4	4	3,7	4,1	4,6
Number of pairs of rostral teeth	2	2	2	2	2	2	2	2	2	2	2	3,1		2
Rostral teeth	large	large	small	large	large	large	large	large	small	small	small	small	small	of moderate size
Anterior gastric spine	micr.[1]	slightly larger than N° 1	micr.	1/3[2]	micr.	1/3	1/3	1/3	micr.	micr.	micr.	micr.	micr.	micr.

N° 1—3 Stat. 45; N° 4 and 5 Stat. 88; N° 6 Stat. 178; N° 7 Stat. 211; N° 8 Stat. 300; N° 9—14 Stat. 316.

2. *Pontophilus modumanuensis* Rathb. Pl. XXI and XXII, Fig. 64—64*f*.

Pontophilus modumanuensis M. J. Rathbun, in: U. S. Fish Commission Bull. for 1903, Part III, Wash. 1906, p. 910, textfigure 63.

Stat. 89. June 21. Pulu Kaniungan Ketjil. 11 m. Bottom coral. 2 adult, ova-bearing females.
Stat. 297. January 27, 1900. 10° 39′ S., 123° 40′ E. South-east of Rotti island. 520 m. Bottom soft, grey mud with brown upper layer. 1 adult, ova-bearing female.

The present specimens are referred with some doubt to this species. According to the description the antennal peduncle should reach to the middle of the second antennular article, in our specimens, however, the slender peduncle reaches considerably beyond the antennular peduncle, either to the distal fourth of the antennal scale (the specimen from Stat. 297) or to the distal third, in the two others. The textfigure in Miss Rathbun's description is no doubt inaccurate and incomplete. The median carina, that stops short of the posterior margin of the carapace, is wanting in that figure. According to the description the slender rostrum is armed on its basal half with two spines on each side: in the figure the margins of the rostrum are smooth, unarmed, while the two spines that are situated more backward behind the eyes, represent no doubt the acute angle of the notch on the orbital margin between rostrum and orbital spine and the microscopical spinule that one observes a little behind that notch, though, in this case, these spinules appear in the figure much too large. Distinct lateral carinae, as are visible in the figure, are in the adult specimens not developed; furthermore the carapace itself and the antennal scale appear in the figure less broad in proportion to their length than in the specimens collected by the "Siboga", but the two last named differences may probably be attributed to the young age of the Hawaiian type.

Though the three Siboga specimens are all ova-bearing, the female from Stat. 297 has a smaller size than the two from Stat. 89, but it is still more remarkable that this smaller specimen accords better with Miss Rathbun's description than the two females from Pulu Kaniungan Ketjil.

The female from Stat. 297 is 21 mm. long from tip of rostrum to tip of telson, measured in the middle line, carapace 6 mm., abdomen 15 mm.; the carapace is almost half as broad (3,2 mm.) as long. The acute rostrum (Fig. 64, 64*b*) that reaches as far forward as the eyes, measures just

1) "Micr." signifies "microscopical", only perceptible by means of the microscope.
2) "1/3" signifies that it measures one-third the length of the posterior gastric spine.

one-fifth the length of the rest of the carapace and is 5-times as long as broad in the middle; the lateral margins are armed with two pairs of strong, forwardly directed spines, the anterior pair arising just from the middle of the rostrum, the posterior near its base. The rostrum rises from the carapace obliquely upward and from the posterior pair of spines runs almost horizontally forward; on the sides of the rostrum feathered setae are implanted, while a few hairs exist on the upper surface. Of the two median spines (Fig. 64*a*) on the gastric region the posterior stands at the anterior fifth of the carapace, the anterior twice as far from the posterior as from the level of the orbital margin; looked at from above the posterior spine appears 3-times as long as the anterior. Between the two spines the carapace is sharply carinated and from the posterior spine a prominent, though rather obtuse crest runs backward, fading away at the posterior sixth of the carapace. Orbital spine reaching to the middle of the cornea, directed obliquely upward; midway between this spine and the rostrum the orbital margin is notched, the inner angle of the notch is rather acute, though not spiniform and from this notch a furrow runs backward and outward, which soon passes into a fine suture that is directed straight backward, though reaching probably not so far as the median crest. A little behind and outwards of the orbital notch a minute spine occurs on the upper border of the furrow, like in *Pont. abyssi* S. I. Smith, *occidentalis* Faxon and other forms. Branchiostegal spine long, reaching a little beyond the level of the anterior border of the eyes and directed outward and forward. The lateral spine, which is also not buttressed by a carina, appears as large as the posterior gastric spine and is placed at the same level as the latter.

The abdomen, telson included, is $2^1/_2$-times as long as the carapace. The tergum of the 3rd somite is slightly prominent backward, so that the posterior margin, when looked at from above, appears triangular with obtuse tip, for the rest the 1st to 5th terga are smooth and rounded. Sixth somite 3 mm. long, almost twice as long as the 5th, upper surface grooved longitudinally, the groove very shallow. Telson 3,76 mm. long, one-fourth longer than 6th somite, tapering backward anteriorly more strongly than posteriorly; the tip is 0,22 mm. broad, $^1/_{17}$ the length of the telson, but, on the level of the posterior pair of dorso-lateral spinules, the telson is hardly one and a half as broad as at the tip. The telson, which is faintly grooved about to the posterior third, bears two pairs of dorso-lateral spinules, the anterior pair, that are 0,1 mm. long, are implanted immediately before the middle, the posterior pair, 0,12 mm. long, at the posterior third; the acute tip (Fig. 64*c*) is flanked at either side by 3 spines, the inner pair are very long, 0,75 mm., one-fifth the length of the telson, and feathered, the following pair are glabrous, project only by half their length beyond the tip and measure little more than one-third the length of the submedian pair; the outer pair, finally, 0,1 mm. long, at the posterior extremity of the lateral margins, measure one-third the length of the intermediate pair. The narrow inner uropods reach, beyond the tip of the telson, to the middle of the submedian pair of terminal spines, the outer uropods are distinctly shorter, reaching to the posterior extremity of the lateral margins of the telson, their apex is rounded and without diaeresis.

The eyes, which are large, their greatest diameter being in proportion to the length of the carapace, rostrum included, like 1 : 7,5, are of a pale sooty colour, the inner margin more blackish.

The antennular peduncle and the pointed stylocerite agree with the original description, 2nd joint of peduncle about one and a half as long as broad.

Spine at the antero-external angle of 2nd antennal article a little shorter than the stylocerite; antennal scale (Fig. 64*d*) 2,9 mm. long and 0,94 mm. broad in the middle, about half as long as the carapace and 3,1-times as long as broad in the middle; outer margin slightly concave, the terminal spine, that almost reaches to the rounded apex of the lamella, though not exceeding it, is 0,34 mm. long, between $^1/_8$ and $^1/_9$ the length of the lamella, and 0,15 mm. broad at base. According to the original description the antennal peduncle should reach to the middle of the second antennular segment, in the female from Stat. 297, however, the peduncle, which is 6-times as long as thick, reaches, far beyond the antennular peduncle, to the distal fourth of the scale.

The external maxillipeds project by half their terminal joint beyond the antennal scale and their penultimate joint reaches as far forward as the antennal peduncle.

The anterior peraeopods are wanting. Second peraeopods (Fig. 64*e*) very short; merus 1,08 mm. long, slender, 8-times as long as broad, carpus 0,5 mm. long, nearly half as long as the merus, with 7 or 8 long setae at the distal margin and 3-times as long as the distal margin is broad; palm 0,4 mm. long, one-fifth shorter than the carpus, the margins parallel and 2,7-times as long as broad; the slender tapering and gaping fingers are just as long as the carpus, the unguis of the immobile finger is almost as long as the rest of this finger, the two ungues of the dactylus are half as long; a tuft of setae, of which the longest are as long as the fingers, exists at the articulation of the dactylus, a few setae are also observed on the palm and on the fingers, while the inner margin of the dactylus is beset with 7, that of the immobile finger with 4 stiff setae. The ischium appears nearly as long as the merus and both joints are provided with long feathered setae.

The setaceous peraeopods of the 3rd pair reach by the dactylus and half the propodus beyond the antennal scale, those of the 4th pair, which, like the 5th, are much stouter, by half the dactylus, last pair about as long. Dactyli of 4th and 5th pair styliform, slightly curved and little shorter than their propodi.

Of the 1st pleopod of the female from Stat. 297 the outer branch is lanceolate, 2 mm. long and 4-times as long as broad; the endopodite is one-fourth shorter, much narrower, 8-times as long as broad and provided with very long feathered setae, very long hairs and setae occur also on the inner border of the protopod. Exopodite of 2nd pleopod (Fig. 64*f*) 1,8 mm. long, 3,5-times as long as broad, endopodite 5-times and nearly just as long as the outer branch; stylamblys 1 mm. long, 10-times as long as thick, with distinct cincinnuli on the tip, the outer margin with 12 long feathered setae and with 5 on the distal half of the inner margin. The three following pleopods resemble the second, but the inner branch and the stylamblys become gradually a little shorter, so that in the 5th pleopod the inner branch is one-sixth to one-seventh shorter than the exopodite and the stylamblys only 0,45 mm. long, namely about one-third the length of the endopodite, with only 5 or 6 feathered setae on its outer margin.

Eggs very numerous, 0,6 mm. long.

The female from Stat. 297 has been described in detail, because, on account of its

smaller size and other characters as e. g. the relative length of the anterior gastric spine and the form of the scaphocerite, it more approaches the Hawaiian type of *Pont. modumanuensis* than the two specimens from Stat. 89.

The carapace of one of these females from Stat. 89 is 6,6 mm. long and 4,1 mm. broad, the abdomen about 18 mm. long, 2,7-times as long as the carapace. The rostrum (Fig. 64*g*), 0,84 mm. long, measures only $^1/_7$ the length of the rest of the carapace, being relatively shorter than in the female from Stat. 297; it reaches only to the middle of the corneae, distinctly shorter than the eyes, is, like in the specimen from Stat. 297, 5-times as long as broad in the middle and likewise armed with two pairs of spines. The posterior gastric spine stands at the anterior sixth of the carapace, the anterior but little farther distant from the posterior than from the orbital margin, but the anterior spine is much smaller than in the female from Stat. 297 and measures only one fifth of the posterior, so that it may easily be overlooked. For the rest the carapace resembles that of the female from Stat. 297, the supraorbital notch or fissure curves likewise outward and backward and runs thereupon as a fine suture straight backward to the posterior third of the carapace; nearly on the middle of the latter the surface is slightly thickened longitudinally just above the suture, but a longitudinal keel exists here, properly speaking, not nor posterior to the lateral spine. The surface of the carapace is finely pubescent and longer hairs are observed on the hepatic region in front of the lateral spine and just below it. From the posterior extremity of the described lateral suture a sinuated ridge or keel runs obliquely forward and downward and runs to the hepatic groove below the lateral spine.

The abdomen agrees with that of the female from Stat. 297, but the 6th somite is rounded, presenting no shallow groove, and this groove is also wanting on the telson; unfortunately in one of the specimens the tip is broken off, while in the other the terminal spinules are lost. The telson is pubescent and this has no doubt also been the case on the rest of the abdomen.

In the younger of the two females, of which the carapace is 6,6 mm. long, the proportion between the greatest diameter of the eyes and the length of the carapace is like 1 : 8,2, in the other female, of which the carapace is 6,8 mm. long and 4,2 mm. broad, it is like 1 : 7,7, in both females the eyes are of a light fawn colour, with the inner border of the cornea blackish.

Antennular peduncle, stylocerite and flagella as in the female from Stat. 297. In the larger of the two females the antennal scale (Fig. 64*h*) is 3,1 mm. long, not yet half as long as the carapace, and 2,5—2,6-times as long as broad in the middle; the scale appears thus comparatively broader than in the female from Stat. 297, the terminal spine, long 0,36 mm. and 0,15 mm. broad at base, is distinctly shorter than the lamella and on the outer third part of the upper surface of the scale numerous long hairs occur, which were not found in the female from Stat. 297. The antennal peduncle, 1,7 mm. long and 0,36 mm. thick, is a little thicker than in the specimen from Stat. 297 and extends only to the distal third part of the scale.

External maxillipedes as long as in the female from Stat. 297.

The anterior legs (Fig. 64*i*) reach a little beyond the tip of the antennal scale, exopodite apparently wanting. A spine occurs at the far end of the upper border of the merus and a

smaller below it, on the middle of the distal outer margin; there is a strong spine on the lower outer angle of the distal margin of the carpus, a smaller one at the upper outer angle and a third, as small as the latter, at the lower inner angle. Propodus in the larger female 3,2 mm. long, almost half as long as the carapace, rostrum included, and 3,3—3,4-times as long as broad in the middle.

Peraeopods of the 2nd pair (Fig. 64*f*) very short, reaching to the middle of the merus of the anterior legs; of the larger female the merus is 1,06 mm. long and 8,4-times as long as broad in the middle; carpus 0,45 mm. long, almost half as long as the merus, nearly 4-times as long as broad at the distal extremity, of a more slender form than in the female from Stat. 297; palm just as long as the carpus and 3-times as long as broad at the articulation of the dactylus; fingers widely gaping, slightly longer than the palm, though resembling for the rest those of the female from Stat. 297. Following legs and pleopods like in this female.

Eggs very numerous, 0,5 mm. long, a little shorter and thicker than in the female from Stat. 297.

It is for the present impossible to decide whether the slight differences between the females from Stat. 89 and the female from Stat. 297 must be attributed to the former being quite full-grown, the latter not yet or to the former belonging to a distinct variety or species. As regards the Hawaiian type, the chief difference is presented by the antennal peduncle reaching only to the middle of second antennular article, but, like the more elongate shape of carapace and scaphocerite, also this difference may perhaps be owing to the young age of Miss Rathbun's specimen, of which the carapace and rostrum were only 5,3 mm., the abdomen, telson excluded, 10,5 mm. long. The examination of a larger number of specimens both from the Hawaiian Islands and the Indian Archipelago shall be necessary to elucidate and decide these questions.

General distribution: Hawaiian Islands (Rathbun).

3. *Pontophilus modestus* de Man. Pl. XXII, Fig. 65—65*f*.

Pontophilus modestus J. G. de Man, in: Zoologische Mededeelingen, uitgegeven vanwege 's Rijks Museum van Natuurlijke Historie te Leiden. 1918, Deel IV, Afl. 3, p. 162.

Stat. 253. Dec. 10. 5°48'.2 S., 132°13' E. West of Kei-islands. 304 m. Bottom grey clay, hard and crumbly. 2 specimens.

This species belongs to that Section, in which the abdomen is smooth and the carapace has only one spine in the middle line; the nearest allied forms are apparently *Pont. trispinosus* Hailstone, *Pont. candidus* Kemp (especially the male) and *Pont. plebs* Kemp.

The two specimens that are of unequal size, do not agree in all details with one another, so that the larger shall be described as the type. This specimen is 21,35 mm., long, measured in the middle line, the carapace being 5,2 mm. long, the abdomen 16,15 mm. Carapace and abdomen smooth. The carapace (Fig. 65, 65*a*), which is 1,6-times as long as broad, the rostrum included, shows its greatest width at the level of the hepatic spines. The rostrum (Fig. 65*b*), measured to the level of the orbital margins, proves to be 0,6 mm. long, i. e. one-eighth

the length of the rest of the carapace, and reaches to the middle of the eyes; it is dorsally hollowed, the lateral borders converge from the base to a little beyond the middle and diverge thereupon slightly to the anterior margin, which is straight, truncate with rounded lateral angles. The rostrum is 0,16 mm. broad in the middle and immediately behind the anterior margin 0,19 mm., the latter being one-third the length, while the rostrum proves to be 3,75-times as long as wide in the middle. The lateral margins of the rostrum and the orbital margin are glabrous, not hairy. The orbital margin from the antero-external angle of the rostrum to the orbital spine appears semi-circular, so that the very small, orbital spine reaches to the middle of the eyes, almost as far forward as the rostrum. Antennal spine strong, reaching beyond the level of the eyes, slightly divergent and buttressed by a long, sharp carina. From the orbital margin, from a point situated a little farther distant from the rostrum than from the orbital spine, a shallow groove runs at first obliquely outward and backward and then curves towards the uppermost of the three spines on the side of the carapace; this groove is bounded at the inner side by a ridge, so that the surface of the carapace at the inner side of this ridge is situated at a somewhat higher level than outside of it. A much finer suture runs from just outside the orbital spine backward to near the upper of the three lateral spines of the carapace. There is no minute spine close to and just below the antennal spine as occurs in *Pont. Kempii* and other species. At nearly one-sixth its length from the base of the rostrum the carapace bears one well-developed, acute spine, directed forward and slightly upward; from this spine a short rounded carina runs backward, that already disappears before the middle of the carapace, while the rest of the latter is rounded. Midway between this spine and the rostrum a rather deep furrow runs transversely across the carapace. As already remarked, the carapace is armed at either side with three spines. The 1st or uppermost is situated posterior to the orbital spine, just behind the level of the dorsal spine, and buttressed by an obtuse carina, which in a lateral view of the carapace runs backward and slightly downward; it is a little smaller than the dorsal spine. The 2nd or hepatic spine, as large as the dorsal, is placed a little in advance of it, on a level with the carinated antennal spine; the hepatic spine is not carinated and half as far distant from the 1st as the 1st from the dorsal spine. The 3rd spine, finally, as large as the hepatic, is placed midway between the latter and the antennal spine, at a slightly lower level, immediately behind the antennal crest. From the antennal spine a shallow groove runs backward and curves toward the hepatic spine, which is also separated from the 3rd spine by a groove. A few hairs occur on the branchial region and just below the third and the antennal spine.

Abdomen 3-times as long as carapace, rostrum included; it is perfectly smooth, neither sculptured nor carinated. Anterior and posterior margins of the pleura rounded or obtuse; posterior margin of 3rd tergum transverse, not projecting at all. Sixth somite 3,1 mm. long, one and a half as long as the 5th, 4,3-times as long as thick in the middle, not grooved above; the outer angles of the posterior margin terminate each in a very small spine, 0,06 mm. long, the only spines that one observes on the abdomen. Telson 3,75 mm. long, a little longer than the 6th somite, strongly tapering, flattened above; there are two pairs of dorso-lateral spinules, long 0,12 mm., the anterior pair just behind the middle, the other at the posterior fifth; the width, 0,22 mm., of the tip is one-third the width of the base of the telson, the tip (Fig. 65*c*)

ends in a short acute apex and is only half as long as wide. At either side of the tip 3 spines are implanted, the 1st is 0,4 mm. long, reaches by almost its whole length beyond the apex and is feathered, the 2nd, 0,52 mm. long, the longest of all, is glabrous, the 3rd at the outer angles as long as the dorso-lateral spinules. Inner uropods narrow, distinctly shorter than the telson, outer uropods a little shorter than the inner.

Eyes large, the greatest diameter measuring one-sixth the length of the carapace; cornea of a dark purplish colour, facets rather large.

The antennular peduncle reaches to just beyond the middle of the antennal scale, antero-external angle of basal joint spiniform, subacute and a smaller spine occurs on the distal margin of this joint; 2nd and 3rd joint together shorter than 1st, 3rd a little longer, but less broad, than 2nd; lateral process lamelliform, rounded, a little shorter than 1st article; upper flagellum measuring one-third the length of the carapace, reaching by half its length beyond the antennal scale and rather broad, just as broad as the middle of the rostrum.

Tooth at the infero-external angle of 2nd antennal article obtuse with a minute acute tip, peduncle a little shorter than the scale. Antennal scale (Fig. 65*d*) 1,75 mm. long, one-third the length of the carapace, rostrum included, twice as long as broad, the greatest width just behind the middle; it narrows moderately anteriorly, the slightly arched distal border is still rather broad and makes an obtuse angle with the inner margin; terminal spine not or hardly exceeding the apex of the lamella, outer margin straight, unarmed.

External maxillipedes reaching by almost the whole length of their ultimate joint beyond the antennal scale, ultimate joint one and a half as long as the penultimate.

The 1st pair of peraeopods (Fig. 65*e*) project by three-fifths their propodus beyond the antennal scale. Merus slender, with a very small, acute spine at the distal extremity of the upper border and with the margins setiferous; the carpus appears in a lateral view one and a half as long as thick and is unarmed; propodus of subchela half as long as the carapace, rostrum included, slender, 4,6-times as long as wide in the middle, "thumb" measuring $^1/_{11}$ the length of the propodus, slender, 3-times as long as broad at its base and formed of a single acuminate spine.

The second peraeopods extend to the far end of the merus of the 1st pair and are clothed with long setae. Carpus 0,6 mm. long, 3-times as long as thick distally. Chela a little longer than carpus, palm slightly broader than long, fingers 3-times as long as the palm, a little gaping, immobile finger distinctly broader than the dactylus. Third legs very thin, as long as the 1st pair. Fourth (Fig. 65*f*) and 5th pair (Fig. 65*g*) stout, 4th stouter than 5th. The 4th pair reaches hardly beyond the antennal scale, the 5th hardly beyond the 2nd joint of the antennal peduncle. Carpus of 4th pair 0,96 mm. long, 0,38 mm. broad, 2,5-times as long as broad. Propodus 1,6 mm. long, about 1,7-times as long as the carpus, broadest at the proximal third, the greatest breadth one-sixth the length. Dactylus slender, tapering, nearly straight, half as long as the propodus. Excepting the dactylus this leg is fringed with long hairs especially along the upper margin. The carpus of the 5th leg is 1,06 mm. long, a little longer than that of the preceding pair, and 3,5-times as long as broad in the middle. Propodus 1,9 mm. long, longer than that of the 4th pair, 8-times as long as the greatest width at the proximal sixth and narrowing regularly

towards the distal end. Dactylus almost half as long as the propodus, resembling that of the 4th peraeopods.

Exopodite of 2nd pleopod (Fig. 65*h*) 1,8 mm. long, 4,7-times as long as broad proximally; the endopodite, 1 mm. long and 5-times as long as broad, is implanted at a somewhat lower level and reaches therefore not yet to the middle of the outer branch. No trace of stylamblys. Both the exo- and the endopodite are fringed with long feathered setae.

The other specimen differs by the following:

1) By its smaller size, the entire length being 14 mm., the carapace 3,8 mm. long, the abdomen 10,2 mm.; the 6th somite is 1,8 mm. long, 0,5 mm. thick in the middle, the telson 2,65 mm. long. These numbers show that, in proportion to the length of the carapace, the abdomen, the 6th somite and the telson are a little shorter, the 6th somite, moreover, a little thicker.

2) The rostrum, 0,48 mm. long, measures one-seventh the length of the rest of the carapace, it is 4-times as long as broad in the middle and the anterior margin is slightly concave.

3) From the gastric spine a carina runs backward to a little behind the middle of the carapace; though this carina is obtuse and not prominent at all, it is, however, quite distinct.

4) The 1st or uppermost lateral spine is wanting.

5) The eyestalks show the same ochraceous colour as the body, though a large reniform spot, that occupies almost the whole upper side of the eye, is of a black colour and there is a small tubercle in the notch of the reniform spot.

6) The joints of the upper antennular flagellum are of a more slender shape.

7) The scaphocerite (Fig. 65*i*) 1,45 mm. long and 0,64 mm. broad, measures a little more than one-third the length of the carapace and is 2,3-times as long as broad; the antero-internal angle of the lamella is more pronounced, though obtuse, and exceeds slightly the terminal spine. Antennal peduncle as long as the scale.

8) The peraeopods of the 1st pair (Fig. 65*j*), that reach only by one-fifth the propodus beyond the antennal scale, are of a stouter shape. Propodus of subchela 1,6 mm. long and 0.48 mm. wide in the middle, not yet half as long as the carapace and 3,33-times as long as broad in the middle; "thumb" measuring $^1/_6$ the length of the propodus.

9) The exopodite of the 2nd pleopod is 1,2 mm. long and 4,6-times as long as wide proximally, showing the same form as in the type; the endopodite is half as long and 4-times as long as broad, but, being implanted at a lower level, reaches only along the proximal fourth of the exopodite. No trace of stylamblys.

The principal differences are the absence of the 1st or upper lateral spine of the carapace and the stouter shape of the 1st pair of peraeopods, while the others are no doubt partly owing to the difference of age. In neither of the two specimens the upper antennal flagellum shows the characters proper to the male: except the first, the joints of this flagellum appear, indeed, in the male of other species much broader than long, but in both specimens from Stat. 253 they are longer than broad.

When therefore the two specimens belong to the same sex, the smaller one should be

regarded as a variety — but the examination of a larger number of specimens is necessary to elucidate and decide this question.

4. *Pontophilus incisus* Kemp. Pl. XXII, Fig. 66, 66*a*.

Pontophilus incisus Stanley Kemp, in: Records of the Indian Museum, Calcutta, Vol. XII, Part. VIII, December 1916, p. 357, Pl. VIII, fig. 1.

Stat. 7. March 11. 7° 55'.5 S., 114° 26' E. Reef of Batjulmati (Java). 2 ova-bearing females.
Stat. 51. April 19. Madura-bay and other localities in the southern part of Molo-strait. 54—90 m. Bottom fine grey sand; coarse sand with shells and stones. 1 male and 1 ova-bearing female.
Stat. 133. July 25/27. Anchorage off Lirung, Salibabu-island. 36 m. Bottom mud and hard sand. 1 ova-bearing female.
Stat. 240. Nov. 22 till Dec. 1. Banda. 9—36 m. Black sand. Coral. Lithothamnion-bank in 18—36 m. 1 egg-laden female.
Stat. 313. Febr. 14/16, 1900. Anchorage East of Dangar Besar, Saleh-bay. Up to 36 m. Bottom sand, coral and mud. 1 female without eggs.

The present specimens fully agree with Stanley Kemp's excellent detailed description and figures. The largest specimen is the female from Banda, which is full-grown, 18 mm. long; the male is 14 mm. long, the other females are shorter than 18 mm. The rostrum (Fig. 66, 66*a*) in this species is, as Mr. Kemp rightly describes, abruptly depressed at a right angle, the lateral margins of the distal depressed part converge to the rounded tip, but those of the proximal part of the rostrum are produced to a slender spine with obtuse tip; the two spines project in the full-grown female almost horizontally forward, diverge slightly and are a little shorter than the eyes, reaching to the distal fifth or sixth part of the cornea. The length of the rostral spines is, however, variable, for in the female from Stat. 51, which is a little smaller than that from Banda, the spines reach, beyond the eye, to the level of the anterior margin of 2nd antennal article and are here rather strongly turned upward. In the male the rostral spines are short, as long as the eyes and a little turned upward, in the young female, long 15 mm., from Stat. 313, they are also very short, reaching only to the middle of the cornea and in the ova-bearing specimens from Stat. 7, which are only 13 mm. and 11 mm. long, just as far. The original description reads that the distal border, in dorsal view, is strongly concave, but the lateral angles of this concavity are not described as spines.

The distinctly faceted corneal portion of the large eyes has a dark sea-green colour; it is reniform in outline and in the dorsal emargination of the inner margin of the cornea the eye bears a small subacute tubercle, which is not mentioned in the original description.

In the ova-bearing female, almost 16 mm. long, from Stat. 133 the 1st or anterior ridge in the mid-dorsal line of the carapace ends in a conspicuous tooth as usual, but the 2nd is not developed, the 3rd is uneven and the 4th ends in a minute acute spine. The three anterior ridges of the 1st lateral carina terminate each in a minute spinule, but the remainder are inconspicuous. The hepatic spine is well-developed, but the spine posterior to it is also hardly perceptible, while the remaining ridges of the 2nd lateral carina bear no small denticle.

General distribution: Andaman Islands (Kemp).

5. *Pontophilus angustirostris* de Man. Pl. XXII and XXIII, Fig. 67—67*o*.

Pontophilus angustirostris J. G. de Man, in: Zoolog. Mededeelingen uitgegeven vanwege 's Rijks Museum van Natuurlijke Historie te Leiden. 1918.Deel IV, Afl. 3, p. 163.

Stat. 7. March 11. 7° 55'.5 S., 114° 26' E. Reef of Batjulmati (Java). 1 ova-bearing female.
Stat. 50. April 16/18. Bay of Badjo, west coast of Flores. Up to 40 m. Bottom mud, sand and shells, according to locality. 1 male.
Stat. 142. August 5/7. Anchorage off Laiwui, coast of Obi major. Plankton, at night. 1 very young specimen.
Stat. 164. August 20. 1° 42'.5 S., 130° 47'.5 E. Between Misool and New Guinea. 32 m. Bottom sand, small stones and shells. 2 females without eggs.
Stat. 273. Dec. 23/26. Anchorage off Pulu Jedan, East coast of Aru-islands. 13 m. Bottom sand and shells. 1 female without eggs.

Until at present only two species of *Pontophilus* were known, in which the outer border of the antennal scale is armed with a tooth, namely *Pont. sculptus* (Bell) and *Pont. incisus* Kemp; *Pont. angustirostris* now appears as a third, in which this rare character is observed, but, besides by this feature, this new form also in other characters and in its whole outer appearance proves to be closely related to these two species.

The largest specimen, the female from the east coast of the Aru-islands, is 17,7 mm. long, measured in the middle line from tip of rostrum to tip of telson, the carapace, rostrum included, being 4,5 mm. long, the abdomen 13,2 mm. The rostrum (Fig. 67, 67*a*, 67*b*), which is longitudinally channelled, measures one-fourth the length of the rest of the carapace and reaches to the distal fifth of the pronated eyestalks; it terminates distally in two slightly divergent, pointed spines, so that the distal border appears in a dorsal view strongly concave, the depth of the concavity being slightly more than half as long as the distance between the apices of the two spines. The lateral margins of the rostrum, which is very narrow, the breadth in the middle being only one-fifth the length, the terminal spines included, are anteriorly parallel and from about the middle curve regularly into the orbital margin; they are, like the latter, fringed with long hairs, that, as in *Pont. incisus*, partly conceal the eyes.

Orbital margin entire, not notched. Orbital spine well-developed, reaching to the middle of the cornea and to the distal fifth of the rostrum; the distance between the orbital spine and the rostrum, measured transversely, is just as long as the rostrum without the terminal spines. Antennal spine much longer than the orbital, reaching to the anterior border of the 2nd joint of antennal peduncle and as long as the eyes; this spine is buttressed by a sharp carina, that does not reach to the level of the hepatic spine.

Carapace depressed, as broad as long, the rostrum excluded; as in *Pont. incisus*, a shallow groove runs transversely across the base of the rostrum. Just behind this groove one observes, at one-fifth the length of the carapace from the level of the orbital margin, a small sharp spine in the middle line, directed horizontally forward, while a sharp carina runs in the mid-dorsal line from the posterior margin of the carapace about to the middle of it; from the gastric spine also usually a sharp carina runs backward for a short distance, the two carinae, however, are not continuous, but separated by a short smooth interspace. The lateral sides of the carapace show five longitudinal carinae, three of which end anteriorly in a sharp spine;

they are situated not far from one another on the middle longitudinal third part of the sides. The 1st or uppermost carina terminates anteriorly in a spine, placed immediately behind the level of the gastric spine; this carina, that runs at the level of the orbital spine, is sharp, runs backward at first straight, then slightly outward or already from the spine slightly outward and backward, as far as the middle of the carapace, until the shallow cervical groove, that separates the large gastric from the branchial region. Immediately behind the posterior extremity of this carina, but a little more outward and separated from it by the cervical groove, begins the 2nd carina, that forms the boundary between the cardiac and branchial regions: the anterior half is rather obtuse and curves inward, while the sharp posterior half runs straight backward to near the posterior border of the carapace; the 1st and 2nd carina may also be considered as one single crest, which is interrupted by the cervical groove. The 3rd terminates anteriorly in the hepatic spine, placed a little before the level of the gastric; this carina that runs just above the level of the antennal spine, in a lateral aspect of the carapace, is also sharp and extends nearly as far backward as the 1st, but in the full-grown specimen from Stat. 273 it appears posteriorly rounded transversely. The 4th carina, which, like also the 5th, is sharp and straight, runs, midway between the latter and the posterior half of the 2nd, to near the posterior border of the carapace; it runs on the level of the hepatic or 3rd crest, from which it is separated by a broad interspace. The 5th or undermost carina ends anteriorly in a spine, that is smaller than the two other lateral and than the gastric spine; this carina, placed on the level of the antennal spine, is the longest of all, begins at the cervical groove just before the middle of the carapace, when measured between the base of the rostrum and the posterior margin, and terminates near the latter. The carapace is a little less high than broad; the strongly curved and marginated lower border ends anteriorly in a small, acute, branchiostegal spine, which is hardly half as long as the antennal spine, below which it occurs.

The abdomen, which, telson included, is 3-times as long as the carapace, resembles closely that of *Pont. incisus* Kemp, both as regards the terga and the pleura, because they are sculptured and carinated after the same pattern. The telson which is but little longer than one-sixth the entire length, being in the adult female from Stat. 273 3,2 mm. long, is faintly grooved; it is rather narrow and tapers considerably backward, the breadth of the tip being only about one-fourth the breadth at the base; the anterior pair of dorso-lateral spinules is implanted at the posterior third, the posterior one and a half as far distant from the apex as from the anterior pair. The triangular tip (Fig. 67*c*) is but little longer than broad at base and armed at either side of the acute extremity with 3 spines; the outer spine, at the posterior extremity of the lateral borders of the telson, is very small, 0,04 mm. long, hardly one-fourth the breadth of the tip; the two other spines, that are feathered, are very long, 3 to 4-times as long as the triangular tip is broad, are of equal length and reach considerably beyond the acute extremity. Inner uropods narrow, reaching to the apex of the telson, outer much shorter.

Eyes large, proportion between the greatest diameter of the corneal portion to the length of the carapace, rostrum included, as 1 : 5,6; the eyes are of a dark slate colour, distinctly and finely faceted, reniform and bear, like in *Pont. incisus*, a small acute tubercle above.

The antennular peduncle reaches hardly to the tooth on the outer margin of the scaphocerite and the lateral process or stylocerite is obtuse and reaches not yet the distal extremity of the 1st article, from which it is rather far distant; 3rd article a little longer than 2nd, both very short, as in *Pont. incisus*.

The antennal scale (Fig. 67*d*) resembles closely that of *Pont. sculptus* (Bell) [Confer: S. Kemp, The Decapoda Natantia of the Coasts of Ireland, Dublin 1910, Plate XXI, fig. 6*b*]; it is in the adult specimen from Stat. 273 2,25 mm. long and 0,78 mm. broad, the greatest breadth a little behind the spine; the scale, 2,9-times as long as broad, is half as long as the carapace, rostrum included, and armed just behind the middle of the outer margin, at four-ninths its length from the base, with a strong acute spine, long 0,12 mm., behind which the outer margin is distinctly concave, while in front of it the margin is straight. Terminal spine almost twice as long as that on the outer margin, but of a more narrow shape, 3-times as long as broad at its base; the spine extends, like in *Pont. incisus*, by almost its whole length beyond the tip of the lamella and the inner margin of the latter is fringed with very long, feathered setae. Second joint of antennal peduncle with a small spine at the antero-external angle; the peduncle, that reaches to the distal fourth of the scale, is of a stout shape, being still a little more than half as broad as the latter.

The external maxillipeds reach by half or two-thirds the ultimate joint beyond the tip of the lamella of the scaphocerite.

The 1st pair of legs extend by one-fourth the propodus beyond the antennal scale. Upper border of merus with a spine at the distal extremity, lower outer border sharply carinated from the proximal extremity to just beyond the middle, distal border of outer surface armed with 3 spines, that are much smaller than the spine at the far end of the upper. Carpus with 2 or 3 spines. Propodus a little more than half as long as the carapace, rostrum included, and 3,2-times as long as broad in the middle; thumb formed of a single articulated tooth.

The second peraeopods (Fig. 67*e*) reach a little beyond the carpus of the 1st pair. Ischium and merus of equal length, the latter nearly 5-times as long as broad in the middle; carpus two-thirds of the merus and a little longer than the chela; palm (Fig. 67*f*) very short, measuring one-fourth the length of the chela and just as broad as long; fingers straight, the dactylus a little less broad than the immobile finger, that terminates in a single unguis, measuring one-third of the finger, dactylus with two ungues. The second legs are fringed on both margins with long hairs; these hairs are on the chela (Fig. 67*g*), the carpus and the lower margin of the preceding joints very short-feathered, but on the upper margin of the basipodite, the ischium and the merus long-feathered.

The three posterior legs resemble those of *Pont. incisus*, the very slender, tapering and slightly curved dactyli of the 4th and 5th pair measure almost three quarters the length of the propodus.

In the female the outer branch or exopodite of the 2nd pleopod (Fig. 67*l*, 67*m*) is well-developed, hardly shorter than the protopod, 4-times as long as broad and clothed with long feathered setae; the endopodite, which is 5-times as long as wide proximally, is a little more than half as long as the outer branch, though it reaches only to the middle of it. The

endopodite is, like the other ramus, fringed with long feathered setae and bears at the posterior third a well-developed appendix interna or stylamblys; this appendix measures one-third the length of the endopodite, is four-times as long as wide in the middle and narrows slightly both to the proximal and to the distal extremity which is rounded, devoid of cincinnuli, but provided with 2 or 3 feathered hairs, while 3 or 4 similar long hairs are implanted on the lateral margins. The exopodite of the 3rd pleopod of the female has the same size and form as that of the 2nd; the endopodite, however, is a little shorter, only half as long as the outer branch and extends only along the two proximal fifths of the latter; the stylamblys measures also one-third the length of the endopodite, but is hardly more than three times as long as wide. In the 4th pleopod of the female the inner branch is still more reduced in size, measuring only two-fifths the length of the outer branch and the stylamblys measures hardly one-third of the endopodite. In the 5th pleopod (Fig. 67 *n*, 67 *o*) of the female, finally, the outer branch measures only two-thirds the length of the outer branch of the 2nd pleopod, but endopodite and stylamblys are here quite rudimentary, the length of the inner branch being only one-fourth that of the outer branch, while the stylamblys measures hardly one-fifth the length of the endopodite and appears devoid of setae.

In the male from Stat. 50 the exopodite of the 2nd pleopod (Fig. 67 *h*, 67 *i*) shows the same form and size as in the female, 4-times as long as wide, but it is nearly as long as the protopod; the inner branch measures two-thirds the length of the outer, reaches a little beyond the middle of it and is provided with a stylamblys at the proximal third. This stylamblys has a quite other form as in the female, it measures a little more than one-third the length of the endopodite, is styliform, six times as long as thick, with a cluster of well-developed cincinnuli on the tip, while the lateral margins are fringed each with 3 or 4 long feathered setae. Besides this true stylamblys the inner margin of the endopodite shows nearly in the middle a truncated prominence, that, perhaps, represents the appendix masculina, because in the following pleopods this prominence does not occur. In the 3rd pleopod of the male the exopodite has the same form and nearly the same size, but the inner branch measures little more than half the length of the outer, it is 5-times as long as wide, fringed with long feathered setae, while the stylamblys, which for the rest resembles that of the 2nd, though being a little thicker, measures almost half the length of the endopodite. In the 4th pleopod of the male the exopodite shows also the same form and size as in the 2nd, but it is distinctly longer than the protopod; the endopodite is not yet half as long as the outer branch, 4-times as long as wide proximally, and the well-developed stylamblys with cincinnuli measures two-fifths the length of the inner ramus. In the 5th pleopod, finally, of the male (Fig. 67 *j*, 67 *k*) both endopodite and stylamblys are still more reduced, the former distinctly shorter than half the exopodite, though reaching only along the proximal third of the latter, while the stylamblys bears still 4 or 5 cincinnuli.

The ova-bearing female from Stat. 7 is 12 mm. long, the specimen from Stat. 142, however, measures only 6 mm.

Eggs 0,6 mm. long, 0,4 mm. broad.

6. *Pontophilus Kempii* de Man. Pl. XXIII, Fig. 68—68*i*.

Pontophilus Kempii J. G. de Man, in: Zoologische Mededeelingen, uitgegeven vanwege 's Rijks Museum van Natuurlijke Historie te Leiden. 1918. Deel IV, Afl. 3, p. 165.

Stat. 65a. May 6. Very near Stat. 65 (7° 0′ S., 120° 34′.5 E.). Between the islands of Saleyer and Tanah Djampeah. 300—400 m. Bottom pale, grey mud, changing during haul into coral bottom. 1 male and 2 females without eggs.

This new form which I have the honour to dedicate to Mr. Stanley Kemp of the Indian Museum, Calcutta, the author of valuable papers on the Indian Crangonidae, is closely related to *Pont. angustirostris* de Man, but distinguished by the different carination of the carapace.

The three specimens are, unfortunately, much mutilated, in the male both rostrum and telson are incomplete and in the two females the abdomen is broken. The largest specimen is the male; measured in the middle line, the carapace (Fig. 68) without the rostrum proves to be 4,2 mm. long, the abdomen without telson 9 mm., so that the entire length will be about 18,5 mm. In one of the two females the carapace, measured in the middle line from the posterior to the level of the orbital margin, appears to be 3,3 mm. long, the rostrum in the middle line without the distal lobes 1,2 mm., the entire length of the carapace 4,5 mm.; the abdomen is about 10 mm. long, the entire length of this female 14,5 mm. The rostrum (Fig. 68*b*) that reaches in this female beyond the eyes to just beyond the distal extremity of basal antennular article, is very narrow, the breadth on the proximal half being one-fifth the length in the mid-dorsal line; the lateral margins of the proximal half run parallel to the middle, from here they first slightly converge, but soon again diverge and the rostrum ends in two slightly divergent lobes. In this female the left lobe is a little broader than the right and obliquely truncated, the right, however, transversely: in the other female one observes just the contrary, the right lobe being a little broader than the left, which is transversely truncated, the right obliquely. Though both specimens are damaged, the two lobes must be regarded, at least provisionally, as being indeed truncated. The rostrum is channelled dorsally and the two terminal lobes are obliquely turned upward; the lateral margins of the rostrum and the orbital margins are fringed with long feathered setae, by which the eyes are partly concealed. In the male the rostrum is broken off in the middle and reaches just beyond the middle of the eyes.

Carapace pubescent, being covered with short feathered setae, which (Fig. 68*a*) in the male are 0,12 mm. long. Orbital margin entire, orbital spine reaching to the middle of the eyes, antennal spine acuminate, slightly divergent and reaching as far forward as the rostrum; the antennal spine is buttressed by a long sharp carina, that extends backward to the level of the anterior extremity of the mid-dorsal crest and immediately below and contiguous to the antennal spine one observes the branchiostegal spine which is half as long. Like in the allied species a shallow groove runs transversely across the base of the rostrum. There is in the mid-dorsal line a sharp, strongly-compressed and prominent carina that runs from the posterior margin of the carapace forward and terminates in a well-developed procurved spine, which is placed at about one-fifth the length of the carapace (without the rostrum) from the orbital margin; this carina is interrupted or indented by the cervical groove a little behind the middle of the carapace. In

the male specimen the carina is a little less prominent and does not end in a spine. On each side of the mid-dorsal carina several other carinae exist on the sides of the carapace, that are all prominent and sharp. From a point, situated just in advance of the level of the anterior extremity of the mid-dorsal carina and nearly midway between the rostrum and the orbital spine, the long subdorsal carina runs backward and slightly outward to near the posterior border of the carapace; in the female this carina ends anteriorly in an acute spine, which is a little smaller than that in the mid-dorsal line, but in the male the anterior extremity is blunt and in both sexes it is indented by the cervical groove. Between this subdorsal and the mid-dorsal carina one observes on either side of the latter, on the gastric region, two small, isolated prominences and posterior to the cervical groove, on the cardiac region, three or four short carinae. Of the two prominences on the gastric region of the female that are subacute and much smaller than the mid-dorsal spine, the anterior is situated on the level of this spine, a little farther distant from the subdorsal than from the mid-dorsal carina, the other prominence is situated posterior to it and a little more laterally, nearly midway between the two carinae; in the male the anterior prominence is twice as far distant from the subdorsal carina than from the middle line and both are obtuse. On the cardiac region of the male are situated on each side of the middle two pairs of short carinae, the carinae of each pair being placed behind one another, while the two pairs are nearly parallel with the mid-dorsal carina; of the two carinae of the inner pair the posterior is almost twice as long as the anterior and this pair is more than twice as far distant from the subdorsal as from the mid-dorsal carina; of the two carinae of the outer pair the posterior is as long as the posterior carina of the inner, the anterior is twice as long, reaches to the cervical groove and almost unites with the subdorsal crest. In the female the inner pair is substituted by one single carina and the two of the outer pair are of equal length, together as long as the inner carina and the anterior reaches by far not the subdorsal crest. Below the subdorsal carina still three others are found. The first of these extends from a point, situated a little in advance of the anterior extremity of the mid-dorsal crest and distinctly farther distant from the subdorsal carina than from the posterior extremity of the antennal crest, backward to the cervical groove, parallel with the subdorsal crest. This carina ends, both in the male and in the female, in a well-developed spine, which in the female is almost as large as the gastric spine; immediately behind this carina and just below it begins the second, which is twice as long, extends straight backward to near the posterior border of the carapace and terminates anteriorly also in a spine, smaller than that of the anterior. The third, finally, which is unarmed, runs in the male parallel with the second and nearly midway between it and the lower border of the carapace; it is little prominent, begins, like the second and like the subdorsal crest, at a short distance from the posterior margin and disappears on the level of the spine of the second. In the female the form of this third carina could not be ascertained with certainty.

The abdomen resembles, as regards grooves and sculpture, that of the allied species, *Pont. incisus* and *angustirostris*, and differs only in minute details. So e. g., while in *Pont. angustirostris* the two juxtaposed carinae of the 4th tergum are fused behind the middle, in *Pont. Kempii* they already unite at the anterior third or fourth and from this point at either

side a prominent carina curves backward and outward to the lateral extremity of the posterior margin of the tergum; between this carina and the posterior margin of the 3rd tergum two shorter carinae are observed on each side. In *Pont. angustirostris*, however, these lateral carinae are rather inconspicuous. The two submedian carinae on the 5th tergum are also prominent and diverge already from about the middle. The two longitudinal carinae on the 6th somite converge slightly backward. Telson and uropods resemble also those of *Pont. angustirostris*, but the anterior of the two pairs of dorso-lateral spinules is placed, in the female, just before the middle and the acuminate extremity is about one and a half as long as wide at base.

Eyes large, their greatest diameter, 1,2 mm., measuring in the male almost one-third the length of the carapace without the rostrum; facets small and numerous, cornea of a dark slate colour.

Second and third joint of antennular peduncle very short, of equal length, together much shorter than basal article; distal margin of the latter with many long, upstanding setae, while the 3rd joint bears a subacute conical tubercle. Upper antennular flagellum of the male very broad, 3,7 mm. long, almost as long as the carapace without the rostrum.

The antennal scale has the same form in both sexes; in the male (Fig. 68*c*) it is 2,52 mm. long, three-fifths the length of the carapace without the rostrum, and 3,6-times as long as broad, the greatest breadth at the proximal fourth; the scale has therefore a rather narrow shape, the inner margin slopes sharply away from the base of the distal tooth, which is slender and long, measuring $^1/_{10}$ the whole length of the scale, and the outer margin, which is strongly concave, is armed, like in *Pont. angustirostris*, with a well-developed spine at the proximal third. The antennal peduncle reaches along four-fifths of the scale and the spine at the infero-external angle of the 2nd article is small.

The 1st pair of peraeopods (Fig. 68*d*, 68*e*) reach in the male as far forward as the antennal scale and are of a rather stout shape. Measured along the upper margin the merus proves to be just half as long as the carapace, rostrum excluded, and to be 2,4-times as long as wide on the outer surface; the upper margin ends distally in a small spine, but, otherwise than in *Pont. angustirostris*, the distal margin of the outer surface is unarmed; lower outer border carinated. Carpus distally with 2 or 3 spines. Propodus of subchela in the male 2,5 mm. long, a little more than half the length of the carapace, without the rostrum, and 2,6-times as long as wide in the middle; thumb formed of a single spine, that measures one-fifth the length of the propodus.

The peraeopods of the 2nd pair reach in the male to the far end of the carpus of the anterior legs; merus 1,1 mm. long, carpus 0,62 mm., chela 1 mm., one and a half as long as the carpus; dactylus 4-times as long as the palm, a little longer but distinctly less broad than the immobile finger, palm as long as wide; the 2nd legs are provided with many long hairs, of which those on the upper margin of the merus are fringed with long, the rest with quite short setulae. The other peraeopods are wanting or incomplete.

Exopodite of 2nd pleopod (Fig. 68*f*, 68*g*) of the male rather narrow, $4^1/_2$-times as long as wide and one and a half as long as the protopod; the endopodite, nearly 6-times as long as broad, measures five-sixths the length of the outer branch and bears a well-developed stylamblys

and a well-developed appendix masculina. The stylamblys, implanted near the proximal third, measures a little more than one-third the length of the endopodite and is styliform, 13 to 14-times as long as thick; the margins bear a few long feathered setae, while one observes on the tip a cluster of cincinnuli. Just before the stylamblys the much thicker appendix masculina is implanted, that reaches to the distal fourth of the endopodite; it is 6-times as long as broad, $2^1/_2$-times as thick as the stylamblys and the truncated tip bears 6 or 7 spiniform, partly pectinated setae.

Of the 2nd pleopod (Fig. 68*h*, 68*i*) of the female the outer branch is well-developed, about 4-times as long as wide, and a little longer than the protopod; the endopodite is rudimentary, hardly half as long as the outer branch, 4-times as long as broad, and has no stylamblys. In order to spare the specimens that are in a poor condition, the other pleopods have not been examined.

7. *Pontophilus japonicus* Doflein. Pl. XXIII and XXIV, Fig. 69—69*j*.

Pontophilus japonicus F. Doflein, Abhandl. K. bayer. Akad. Wiss. II Cl. XXI Bd. III Abth., München 1902, p. 621, Taf. III, fig. 6.

Stat. 95. June 26. 5°43'.5 N., 119°40' E. Sulu Sea. 522 m. Stony bottom. 1 female without eggs.
Stat. 105. July 4. 6°8' N., 121°19' E. North of Sulu-island. 275 m. Coralbottom. 1 male.

Upon my request Professor Zimmer of Munich has been so kind to examine for me the single type specimen, a female, of *Pont. japonicus* Dofl. from Sagami bay, Japan: the results of this examination are the following.

In the first place the outer margin of the antennal scale, which was not described by Doflein, proved to be finely denticulated along the two proximal third parts, in the second place the pleura of the 1st—5th abdominal somites are quite unarmed, so that the words in Doflein's description "Die Seitenteile der ersten fünf Segmente tragen unten je einen Stachel" have no sense and in the third place the sides of the carapace between the lower margin and the mid-dorsal line are provided with only four carinae, not with five, as was erroneously described by the author. Prof. Zimmer added moreover a sketch of the carapace and the abdomen, made by means of a drawing apparatus. As the two specimens, collected by the "Siboga", now fully agree, after this rectification, with Doflein's description and with Prof. Zimmer's sketch, they are referred to *Pont. japonicus*.

Both specimens are of a small size, probably not yet full-grown. Measured in the mid-dorsal line, the male proves to be 12,45 mm. long (carapace 3,6 mm., abdomen 8,85 mm.), the female 13,75 mm. (carapace 4,1 mm., abdomen 9,65 mm.). The rostrum of the male (Fig. 69*a*) closely resembles the textfigure B in the original description and, measured in the middle line as far as the level of the orbital margin, proves to be 0,6 mm. long, i.e. one-fifth the length of the rest of the carapace; the lateral margins are concave and curve regularly into the orbital margins, that are entire, not notched; the breadth of the rostrum in the middle is four-fifths the length and the anterior margin is emarginate and concave in the middle; the antero-external angles are acute and 0,68 mm. distant, a little more than the rostrum, which is longitudinally channelled above, is long. Looked at from before the rostrum appears to be turned downward, the lateral margins converging to the obtuse tip, the anterior margin appears then regularly concave

and the outer angles rounded. The rostrum, looked at from above, appears in the middle as broad as the eyes. Orbital tooth acute, reaching to the distal sixth of the rostrum and buttressed by a sharp carina that first runs outward and then backward to near the spine of the 3rd lateral crest. Antennal tooth reaching beyond the rostrum and even beyond the eyes, buttressed also by a long sharp carina that is directed outward and that extends backward to the level of the base of the rostrum; branchiostegal spine acute, very small, situated just below the antennal spine.

The rostrum of the female (Fig. 69*b*) has a quite different form and length. The rostrum indeed, 0,74 mm. long when measured like in the male, reaches with the antero-external angles a little beyond the eyes and the proportion between its length and that of the rest of the carapace is like 1 : 4,54; it is comparatively less broad than in the male, the breadth in the middle (0,4 mm.) being hardly more than half the length and the anterior margin is much deeper emarginate, the antero-external angles being produced into two hornlike, slightly upturned and divergent spines, the apices of which are rounded.

Without the rostrum the carapace appears a little, namely one-fifth, longer than broad. Just behind the base of the rostrum the carapace is armed in the mid-dorsal line with a well-developed, sharp spine, obliquely directed upward, of which the apex reaches to midway the base of the spine and the level of the orbital margin; from this spine a prominent and sharp carina runs backward in the middle line to the posterior margin and this carina appears in a lateral view slightly convex in the middle, slightly concave anteriorly; in front of the spine it is continued almost to the middle of the rostrum. On either side of the middle the carapace is provided with four sharp prominent carinae, of which the 2nd and the 3rd end anteriorly in a sharp spine. The 1st carina, which is unarmed, is very short; it runs from the posterior margin forward, measures in the female one-fourth, in the male one-fifth the length of the carapace, rostrum excluded, and appears in the female on the left side a little shorter than on the right. The 2nd carina, situated about twice as far from the lower border of the carapace as from the median carina and midway between the latter and the 4th, runs in the female from the terminal spine, which is placed just behind the level of the gastric spine and which is much smaller than it, first slightly outward as far as the cervical groove and then straight backward to the posterior border, not inward as in that species; in the male, however, in which the terminal spine is as small as in the female, the carina runs in a straight line obliquely backward and outward, with no angle in the middle; neither in the female nor in the male this carina is interrupted by the shallow cervical groove, though it appears in a lateral view slightly concave above it. In the textfigure B of Doflein's paper the larger posterior part of this carina is directed inward, not straight backward or outward as in the present specimens, a slight difference perhaps of little importance. The spine of the 3rd carina, a little smaller than the gastric but larger than that of the 2nd, is placed on the level of the gastric spine or slightly in front of it and midway between the level of the orbital and the antennal spine; the carina runs from the spine first slightly downward, then straight backward to the posterior border of the carapace, so that, in a lateral aspect of the latter, the posterior extremities of the 2nd and 3rd carina appear a little less remote from

one another than their terminal spines. The 4th carina, which is unarmed, runs quite straight, nearly midway between the 3rd and the lower border of the carapace, from the posterior margin forward, just below and a little beyond the posterior extremity of the antennal carina, without reaching, however, the lower border. According to DOFLEIN this 4th carina should bifurcate anteriorly, one part should run to the antennal spine, the other to the lower margin of the carapace, but in Professor ZIMMER's sketch these carinae run like in the present specimens. The lower margin of the carapace is marginate, between it and the 4th carina the carapace is quite smooth.

Abdomen $2^1/_2$-times as long as the carapace, rostrum included. The 1st and the 2nd terga are not carinated in the middle line, the posterior part is slightly elevated above the anterior, the boundary-line runs nearly parallel with the posterior margin of the somite, though it slightly approaches it downward. On the 1st somite one observes a slightly curved longitudinal carina that forms the demarcation between tergum and pleuron; this carina, though not reaching to the anterior margin of the somite, may be regarded as a continuation of the 2nd carapacial carina and a little below it a second shorter carina, continuous with the 3rd carapacial, extends to the middle of the pleuron. The demarcation between the tergum and the pleuron of the 2nd somite is also formed by a longitudinal curved carina, the convex side of which is turned towards the pleuron. The 3rd and the 4th somite are carinated in the mid-dorsal line, these carinae are flattened and while the carina of the 3rd slightly widens from before backward, that of the 4th slightly narrows in the same direction. The 5th somite has two dorsal carinae that diverge a little from before backward and the 6th bears a pair of more widely separated and parallel crests along its whole length. The terga of the 3rd, 4th and 5th somites are also partly separated from their pleura by a longitudinal ridge or crest, but for the rest they are smooth, the posterior elevation of the surface being little pronounced. The pleura of the 1st to 5th somite are smooth and unarmed, the anterior and posterior margins rounded or obtuse. The outer angles of the posterior margin of the 6th somite are spiniform, sharp, and the lower margins of this somite show also an acute posterior extremity. Telson strongly tapering, with two pairs of rather stout dorso-lateral spinules, long 0,11 mm., $^1/_{22}$ the length of the telson, the anterior pair a little before the middle, the posterior about at the posterior third; at either side of the acute tip are three spines, those at the outer angle as long as the dorso-lateral, the two others 3-times as long and no doubt of equal length. Inner uropod very narrow, a little longer than the telson, the terminal spines excluded, outer uropod a little shorter than the telson, without diaeresis.

Eyes large, their greatest diameter in the male one-fourth, in the female almost one-fifth the length of the carapace, rostrum excluded, armed above on the emargination of the cornea with a conical tubercle; cornea distinctly faceted, facets rather large, of a gray colour, while in both specimens the left eye is marked on the outer side in the middle with a large black spot.

The antennular peduncle reaches nearly along the proximal fourth of the scaphocerite, 2nd and 3rd joint very short, together shorter than 1st, lateral process lamelliform, rounded, setiferous, a little shorter than basal article; upper (outer) flagellum in the male very broad, 0,35 mm., just half as broad as the anterior margin of the rostrum.

Second antennal article with a well-developed spine at the antero-external angle. Scaphocerite (Fig. 69*c*) in the male 1,8 mm. long, just half as long as the carapace, rostrum included, and 3-times as long as broad; it shows the greatest width at the proximal third and, though the lamella narrows anteriorly, the apex appears still rather broad; the outer margin, which is a little concave, is armed from the base to the distal fourth with 20 or 22, very small, acute teeth, as in *Pont. Lowisi*; these denticles are in the middle well-developed, but decrease in size both anteriorly and posteriorly, so that the three or four first and last of the row are hardly perceptible. The terminal spine that measures $^1/_9$ the length of the scaphocerite, extends by its whole length beyond the tip of the lamella. The stout antennal peduncle reaches to the distal third of the scale.

In the female the upper antennular flagella are thin and slender, only one-third as broad as in the male, and the elongate first joint is nearly as long as the peduncle. The scaphocerite resembles that of the male, but there are only 13 or 14 teeth that reach to the distal third part of the outer margin, for the rest the antennulae and antennae agree with those of the male.

The external maxillipeds project by half their terminal joint beyond the antennal scale.

Merus of 1st pair of peraeopods with a spine at the distal extremity of the upper border, which spine is followed on the distal margin of the outer surface by three smaller spines, that diminish in size towards the anterior border. Carpus with a spine at the lower angle of the distal margin of the outer surface and with another at the upper. Propodus a little more than half as long as the carapace, rostrum included, the proportion being in the male like 1 : 1,88, in the female like 1 : 1,85; propodus in the male 3,5-, in the female 3,6-times as long as broad proximally.

The peraeopods (Fig. 69*d*) of the 2nd pair, that are furnished with long hairs, reach just beyond the carpus of the anterior legs. Merus as long as ischium, 4,5-times as long as broad in the middle, carpus a little more than half as long as the merus, chela about as long, though not shorter than the carpus, palm one-fourth the length of the chela and a little longer than broad, proportion like 15 : 13, fingers (Fig. 69*e*) straight, contiguous, immobile finger decidedly broader than the dactylus. The measurements of these legs, in the male, are the following: ischium 1 mm., merus 0,9 mm. long and 0,19 mm. broad in the middle, carpus 0,58 mm. long, chela 0,63 mm. long (palm 0,15 mm., fingers 0,48 mm., palm 0,13 mm. broad).

The three other peraeopods like in the related species, but in both specimens partly incomplete or wanting. Of the 5th peraeopod of the male the merus is 1,8 mm. long, the carpus 0,6 mm., one-third of the merus, the propodus 1,9 mm., slightly longer than the merus and 12-times as long as broad in the middle, dactylus 1,5 mm. long; the dactylus which, gradually tapering, is slightly curved and very narrow, the width at the base being only $^1/_{15}$ the length. The peraeopods of the 5th pair project by the dactylus beyond the antennal scale.

Of the 2nd pleopod (Fig. 69*f*, 69*g*) of the male the exopodite is 1,2 mm. long and 0,35 mm. broad, 3,4-times as long as broad, of the usual form and distinctly longer than the protopod; endopodite 0,9 mm. long, three-fourths of the outer branch, though not yet reaching to the distal third, 0,16 mm. broad in the middle, being almost 6-times as long as broad, the margins, like those of the outer branch, fringed with long feathered setae. The

proximal third part of the inner branch is almost one and a half as broad as the middle and bears at the outer distal angle two appendages. The outer or stylamblys is styliform, 0,3 mm. long and 7-times as long as thick, with a rounded tip without cincinnuli; while the stylamblys measures one-third the length of the endopodite, the other appendage, the appendix masculina, is 0,64 mm. long, twice as long and reaches to the tip of the endopodite. The appendix masculina shows an uncouth shape, it seems to be formed of two joints, of which the proximal is 0,54 mm. long and 0,06 mm. broad in the middle, 9-times as long as broad, and a little widened distally, the distal margin oblique and two setae at the antero-internal angle; the much smaller distal joint, 0,1 mm. long and 0,06 mm. broad at base, measures but one-fifth the other and bears 5 or 6 long setae on the tip and the inner margin, while the lateral margins of the proximal part are glabrous. In the following pleopods of the male both the endopodite and the stylamblys are as well-developed as in the 2nd, being not or hardly reduced. The 3rd and the 4th were not examined, but I come to this conclusion by the examination of the 5th pleopod (Fig. 69*h*, 69*i*) the measurements of which are the following: exopodite long 1 mm. and 0,3 mm. broad, endopodite long 0,84 mm., 0,2 mm. broad in the middle, little shorter than the exopodite, stylamblys long 0,24 mm., 6-times as long as thick, measuring still almost one-third the length of the endopodite.

Of the 2nd pleopod of the female (Fig. 69*j*) the outer branch is 1,25 mm. long and 0,35 mm. broad, presenting the same form as in the male. The endopodite is 0,72 mm. long, four-sevenths the length of the outer branch and reaching about to the middle of it; it is nearly 4-times as long as broad, shows till near the tip the same width and carries immediately behind the middle a stylamblys which is very short, 0,14 mm. long and 0,04 mm. thick, measuring only one-seventh the length of the endopodite; the stylamblys carries on the rounded tip two long, feathered setae, but is for the rest glabrous and without cincinnuli. Two long setae occur just behind the base of the stylamblys and six between it and the apex of the endopodite, that is tipped with one long seta, while three are implanted on the inner margin of the branch immediately behind the apex, for the rest the margins are glabrous. Also of the female the 3rd and 4th pleopods were not examined, but of the 5th the endopodite is very small, the exopodite 0,8 mm. long and 0,26 mm. broad, the endopodite, however, 0,26 mm. long and 0,12 mm. broad, measuring but one-third the length of the outer branch and twice as long as broad; a stylamblys could not be observed, but 5 or 6 feathered setae occur on the outer margin and the tip, while the inner margin is glabrous. The endopodite, no doubt, will prove to be gradually more reduced, like also the stylamblys, in the 3rd and 4th pleopods.

Doflein's type was only about 10 mm. long and laden with a moderate number of comparatively large eggs.

General distribution: Sagami bay, Japan (Doflein).

Aegeon (Risso) Guér.-Ménev.

The genus *Aegeon* (Risso) Guér.-Ménev., as defined by Stebbing and Alcock, is nowadays represented by 11 species and 3 varieties, including the new *A. Sibogae* and the two new

varieties discovered by the "Siboga". *Aegeon cataphracta* (Olivi), already known since 1792, is found in the Adriatic and in the Mediterranean, has been recorded "with scarcely any doubt" from Goree Island, Senegambia, and has been observed at South Africa, between Cove Rock and Hood Point near East London; this species is, however, also known from the west coast of the Indian peninsula and from the Ceylon Pearl Banks, while by the British Antarctic ("Terra Nova") Expedition of 1910 two specimens were taken 7 miles E. of North Cape, New Zealand! Mr. Stanley Kemp therefore remarks that there is reason to believe that the distribution is continuous round the African coasts, but probably *A. cataphracta* will once prove to occur also in the Indian Archipelago: in this case it would be the most widely distributed of all the species of this genus. Still another form is found in the european seas, viz. *A. Lacazei* (Gourret), which, first observed in the Gulf of Marseilles, was afterwards caught on the N. side of the Bay of Biscay and off the south-west of Ireland.

All the other species occur in the Indopacific, for the genus *Aegeon* is not known from the western Atlantic nor from the west coast of America. *A. rugulosa* Borr. occurs at Haddumati Atoll, Maldives, but, besides this, still five other species are found off the coasts of India. Firstly the variety *affinis* Alcock of *A. pennata* (Bate), which variety is distributed from the Red Sea, the Persian Gulf and the Arabian Sea along the west and east coasts of the peninsula to off Cheduba, Arakan coast, furthermore *A. propensalata* (Bate), recorded from the Andaman Sea, but also from the Key Islands and Botany Bay near Sydney, *A. andamanensis* (W.-Mas.) and *A. bengalensis* (W.-Mas.), known respectively from the Andaman Sea and the Bay of Bengal, and finally *A. orientalis* Hend., which occurs in the Persian Gulf, in the Gulf of Martaban and at Port Blair, Andamans, but which was also taken by the "Siboga" off Lirung, Salibabu-island. Five species and two varieties are at present known to inhabit the Indian Archipelago. At first *A. pennata* (Bate), recorded from Lobetobi Strait, Saleh Bay (Sumbawa) and the Arafura Sea and, under the name of *A. obsoletum* Balss, also from Japan (Dzushi, Enoshima and Sagami Bay); another species is *A. propensalata* (Bate), already mentioned, which was taken off the Key Islands and a new variety of which was captured by the "Siboga" in the Bay of Bima; thirdly the new *A. Sibogae* from the Bali Sea with a variety *intermedia*, obtained between the islands of Rotti and Timor, fourthly *A. Rathbuni*, a form which was already known from the Hawaiian Islands and of which a male was caught by the "Siboga" off Pulu Kaniungan Ketjil, and finally *A. orientalis* Hend. from India. The seas of Japan, finally, are inhabited besides by *A. pennata* (Bate) still by another, viz. *A. Habereri* (Doflein), which is also known from the Hawaiian Islands.

As regards the vertical range, the species of *Aegeon* are generally found in shallow water or at moderate depth, like most other Crangonidae. The greatest depth recorded is that of the new *A. Rathbuni*, which was captured off the Hawaiian Islands between 286 and 399, but also between 293 and 800 fathoms; a male of this species was, however, also obtained by the "Siboga" in water of only 6 fathoms in the Strait of Makassar. Most species, indeed, occur besides in shallow water also below the 100 fathom line, though they are rarely found at depths greater than 300 fathoms. In his work on the Crustaceans of Nizza Risso remarks that *A. cataphracta* is found at a depth of 110 to 165 fathoms, but it occurs in the

Mediterranean also in water of 20—30 and off the west coast of the Indian peninsula in water of 28 fathoms.

Key to the known species of the genus *Aegeon* (Risso) Guér.-Ménev. [1]).

a_1 Second lateral carina of the carapace interrupted anteriorly by a well-defined hepatic groove; lateral parts of 1st and 2nd abdominal somites irregularly lobed, without sharp longitudinal keels continuous with those on the carapace.

b_1 Two or three tubercles, forming an oblique transverse row, between the median and first lateral carinae.

Supra-marginal carina of carapace serrate, abdominal pleura subacute . . . . . *cataphracta* (Olivi)

(G. Olivi, Zoologia adriatica, 1792, p. 50, pl. 3, fig. 1. — Th. R. R. Stebbing, South African Crustacea, Cape Town, 1900, p. 50 (ubi synon.)

b_2 Surface between the carinae of the carapace smooth, without tubercles.

c_1 Supra-marginal carina of the carapace smooth.

d_1 Antepenultimate thoracic sternum in the adult male and in the adult female smooth, in the male the two posterior thoracic sterna sharply carinated, in the female also smooth.

Second peraeopods not different in the two sexes, reaching in both but a little beyond the carpal articulation of the hand of the anterior pair . . . . . *pennata* (Bate)

d_2 The three last thoracic sterna in the male sharply carinated, in the female the carination of the antepenultimate sternum is distinct, but that of the last two is obsolescent.

Second peraeopods in the adult male and in the young as long as in the typical *A. pennata* (Bate), in the adult female almost as long as the anterior pair . . . *pennata* (Bate), var. *affinis* Alcock

(A. Alcock, A descript. Catal. Indian Deep-Sea Crust., Calcutta 1901, p. 118.)

c_2 Supra-marginal carina of the carapace serrate.

d_1 Median carina of the carapace with 8—10 teeth or serrations.

e_1 Abdominal pleura with truncated tips.

f_1 On either side of the middle line of the 2nd abdominal somite there is a broad sinuous ridge, that extends obliquely throughout the length of the somite.

Rostrum not cleft at tip. . . . . *propensalata* (Bate)

(C. Spence Bate, Report Challenger Macrura, 1888, p. 496, Pl. XC, figs. 2, 3; Pl. LXXXVI, fig. 5.)

1) For drawing up this key use has chiefly been made of the Synopsis of the Indian species in Mr. Stanley Kemp's paper, in: Records Indian Museum, Vol. XII, Part VIII, Calcutta 1916, p. 375.

f_2 The ridge on either side of the middle line of the 2nd abdominal somite is broken in two by a vertical furrow. Rostrum triangular, bidentate at apex . . *propensalata* (Bate), var. *hilarula* de Man

e_2 Apices of the abdominal pleura not truncated, at least those of the 2nd somite subacute.

f_1 Last thoracic sternum of the adult female not carinated. From the anterior extremity of the median crest of the 3rd abdominal somite a ridge runs backward and slightly outward, which is separated by an interruption from the transverse ridge near the posterior margin. Huge spine at the anterior extremity of the lateral crest of the carapace only slightly turned outward . *Sibogae* de Man

f_2 Last thoracic sternum of the adult female sharply carinated. On the 3rd abdominal tergum the ridge on either side of the median crest passes without an interruption into the transverse ridge near the posterior margin. Huge spine at the anterior extremity of the lateral crest of the carapace strongly turned outward. *Sibogae* de Man, var. *intermedia* de Man

d_2 Median carina of the carapace with 4 or 5 teeth or serrations.

e_1 Carpus of 2nd peraeopods longer than the chela.

f_1 A tooth on either side of base of rostrum. Antennal scale almost twice as long as wide. . . . *Lacazei* (Gourret)

(P. GOURRET, Révision des Crustacés podophthalmes du Golfe de Marseille, 1888, p. 143, Pl. XII, figs. 19—23 et Pl. XIII, figs. 1—10.)

f_2 No tooth on either side of base of rostrum . . . . *rugulosa* Borr. [1])

(L. A. BORRADAILE, in: Trans. Linnean Soc. London, Vol. XVII, 1917, p. 411, Pl. 59, fig. 12.)

e_2 Carpus of 2nd peraeopods shorter than the chela . . . *Habereri* (Doflein)

(F. DOFLEIN, Ostasiatische Dekapoden, München, 1902, p. 620, Taf. I, figs. 4, 5.)

a_2 Second lateral carina of the carapace not interrupted, hepatic groove absent; lateral parts of the 1st and 2nd abdominal somites with sharp longitudinal keels that are continuous with those on the carapace.

b_1 First lateral carina of carapace with 7 teeth, second with 7—9. Antennal scale little longer than broad.

c_1 Fourth abdominal somite with only one lateral carina on each side . . . . . *orientalis* Hend.

(J. R. HENDERSON, A contribution to Indian Carcinology, 1893, p. 446, Pl. XL, figs. 16, 17.)

1) This species is placed under d^2, because in the figure the median carina of the carapace appears 5-dentate. BORRADAILE's description, however, is insufficient.

c_2 Fourth abdominal somite with three lateral parallel carinae on each side . . . . . *Rathbuni* de Man

b_2 First lateral carina of carapace with 4 teeth, 2nd lateral with 3 to 6.

Antennal scale much longer than broad.

c_1 Second lateral carina of carapace with 5 or 6 teeth, marginal with 3; median carina of 2nd abdominal tergum bispinous *andamanensis* W.-Mas.
(A. Alcock, l. c., 1901, p. 121.)

c_2 Second lateral carina of carapace with 3 teeth, marginal with 2; median carina of 2nd abdominal tergum unispinous *bengalensis* W.-Mas.
(A. Alcock, l. c. 1901, p. 122.)

1. *Aegeon pennata* (Bate). Pl. XXIV, Fig. 70—70*d*.

Pontocaris pennata C. Spence Bate, Report Challenger Macrura, 1888, p. 499, Pl. XCI.
Pontocaris pennata A. E. Ortmann, in: Proc. Acad. Nat. Sciences Philadelphia 1895, p. 175.
? *Aegeon affine* A. Alcock, A descript. Catal. Indian Deep-Sea Crustacea, Calcutta 1901, p. 118.
Aegeon pennata H. Balss, in: Sitzungsber. Kais. Akad. Wiss. Wien, N° IX, Jahrg. 1914, p. 137.
Aegeon obsoletum H. Balss, Ostasiatische Decapoden II. Die Natantia und Reptantia. München, 1914, p. 70, Taf. I, fig. 3.
Aegeon pennata H. Balss, Die Decapoden des Roten Meeres. I. Macruren. Wien 1915, p. 32.
Aegeon pennata Stanley Kemp, Records of the Indian Museum, Vol. XII, Part VIII, December 1916, Calcutta 1916, p. 376.
Illustrations of the Zoology of the "Investigator", Pl. LI, figs. 3, 3*a* and 4.

Stat. 306. Febr. 8, 1900. 8° 27′ S., 122° 54′.5 E. Lobetobi Strait. 247 m. Bottom sandy mud. 2 males and 2 females, one of which is ovigerous.
Stat. 312. Febr. 14, 1900. 8° 19′ S., 117° 41′ E. Saleh Bay, Sumbawa. 274 m. Bottom fine, sandy mud. 2 males and 1 adult female without eggs.

These specimens certainly belong to the typical species described by Spence Bate. Though *Aegeon affinis* Alcock and *A. pennata* (Bate) are considered as specifically identical by Dr. Calman, who was enabled to compare co-types of the former with the three Challenger types of the latter (S. Kemp, l. c.), in my opinion, however, on account of the following observations the species from off Bombay should be considered at least as a distinct local variety *affinis* of *A. pennata* (Bate). In the first place I may call attention to the fact that the Challenger types are young animals: according to Spence Bate, indeed, the entire length was only 24 mm. (carapace 7 mm., abdomen 17 mm.), whereas the ovigerous female (Fig. 70) from Stat. 306 measures 43 mm., being almost twice as long. The adult female from Stat. 312 has the same size, while the largest male is 37 mm. long (carapace 11 mm., abdomen 26 mm.), the male presenting, like in other species, a somewhat smaller size than the female. When the present adult specimens are compared with the figures 3 and 4 of Plate LI of the "Illustrations", the body appears decidedly less broad in proportion to the length than in the species from off Bombay: while in Fig. 3 (the female) the width of the 2nd abdominal somite is just one-fourth and in Fig. 4 (the male) one-fifth the whole length from the tip of the rostrum to that of the telson, in the three females of the typical species it is only one-fifth and in the males (Fig. 70*a*) only about one-sixth the entire length. In *Aegeon affinis* all the carinae of

the carapace are described as coarsely serrate, excepting the supra-marginal. In all the present specimens, excepting the female from Stat. 312, however, the posterior moiety of the lateral crest of the carapace, i. e. the middle one of the three at either side of the median dorsal carina, ends anteriorly in a sharp tooth, directed more or less obliquely outward and forward, and behind it there is but one small notch, while the rest of the moiety is smooth till the posterior margin; the posterior moiety runs, in these specimens, straight backward, parallel with its fellow at the other side of the carapace. In the adult female from Stat. 312 the posterior moiety of the lateral crest is slightly curved outward like in Fig. 3 of the "Illustrations" and behind the anterior spine one observes three much smaller ones, of which the posterior is placed on the left side nearly in the middle, on the right a little behind the middle; also in the female without eggs from Stat. 306, of which the carapace is 11,5 mm. long, measured in the middle line, on the left side traces of two, on the right side of three minute prominences are found behind the anterior spine.

In all the specimens the rostrum is bifid at the tip and the spine on either side at the base seems to be larger than in the species from off Bombay. When the rostrum is examined under the microscope, the triangular notch between the two minute teeth at the apex proves to vary in form and size: in the ova-bearing female the notch is wide anteriorly, the inner margins of the two teeth diverge distinctly forward, so that the teeth are easily perceived, when only examined with a magnifying glass, but in other specimens, as e. g. in a male from Stat. 306, the interspace is much narrower, the two teeth run here nearly parallel, close to one another, and in such specimens the rostrum, when only feebly magnified, will often appear simple and sharp-pointed, though being indeed bidentate. This is perhaps also the case in one of the three Challenger types, in which specimen the rostrum has been described as "sharp-pointed" (Stanley Kemp, l. c., p. 377).

In the male the antepenultimate thoracic sternum is smooth, the two posterior sharply carinated, in the female the three posterior thoracic sterna are smooth. In the variety *affinis*, however, in the male the last three thoracic sterna are sharply carinated in the middle line, in the female the carination of the antepenultimate sternum is distinct, but that of the last two is obsolescent.

According to Prof. Alcock's description the 2nd pair of legs differ in the two sexes of the species from off Bombay and we read here: "in the adult female they are almost as long as the first pair, whereas in the adult male, and in the young, they reach but a very little way beyond the carpal articulation of the hand". In the figure 4 of the "Illustrations", that represents the male, the carpus of the 2nd pair appears as long as the chela, but in the figures 3*a* and 3, of the female, one and a half to twice as long. In all the present specimens, however, the 2nd pair of peraeopods (Fig. 7*0d*) differ not in the two sexes, reaching both in the male and in the female but little beyond the carpal articulation of the hand. In the ovigerous female the 2nd legs extend by two-thirds the chela beyond the carpal articulation of the hand of the anterior legs, the carpus (2,8 mm.), which is 7-times as long as thick at the distal extremity, is one-sixth longer than the chela (2,4 mm.); the dactylus, 1 mm. long, is but little shorter than the palm and the greatest width (0,54 mm.) of the chela measures about one-fourth its length.

The preceding observations justify my opinion that *Aegeon affinis* Alcock must at least be considered as a distinct local variety of *A. pennata* (Bate). *Aegeon obsoleta* Balss seems indeed to be identical with the typical species, because in the figure 3 of the original description (l. c.) the posterior moiety of the lateral crest appears smooth and straight, not coarsely serrulate.

In all the present specimens the deep vertical furrow is well-defined, by which, on either side of the middle line of the 2nd somite, the two tubercles are separated from one another: in *A. propensalata* (Bate) these two tubercles are coalesced to a broad sinuous ridge.

The two submedian carinae of the 6th somite are armed in the ovigerous female with 5 retrorse sharp teeth, that gradually increase in length from before backward, in younger individuals there are only 4 or 3.

Eggs very numerous, small, 0,8 mm. long, half as thick.

Table of measurements in millimeters.

	1 ♂	2 ♀
Length of carapace, measured in the middle line	11	12,7
Distance between the apices of the large hepatic spines. . .	9	10,7
Length of abdomen.	26	30,3
Width of 2nd abdominal somite, looked at from above . . .	6,4	9
Entire length	37	43

N° 1 and 2 larger male and larger ovigerous female from Stat. 306.

Geographical distribution: Japan (near Enoshima, Dzushi, Sagami Bay) (Balss); Arafura Sea (Bate); off the coast of Burma, Bengal and Madras (Kemp); Arabian Sea (Kemp); off Bombay (Alcock); Persian Gulf (Kemp); Red Sea (Balss).

2. *Aegeon propensalata* (Bate) var. *hilarula* de Man. Pl. XXIV, Fig. 71—71*f*.

Aegeon propensalata (Bate), var. *hilarula* J. G. de Man, in: Tijdschr. d. Ned. Dierk. Vereen. (2 Dl. XVI, Afl. 2 and 3, 1918, p. 301.

Confer also the following papers:

Pontocaris propensalata C. Spence Bate, Report Challenger Macrura, 1888, p. 496, Pl. XC, figs. 2, 3; Pl. LXXXVI, fig. 5.
Pontocaris propensalata A. E. Ortmann, Proc. Acad. Nat. Sciences Philadelphia, 1895, p. 175.
Pontocaris media A. Alcock and A. R. S. Anderson, Annals Mag. Nat. History, April 1899, p. 282 (teste W. T. Calman).
Aegeon medium A. Alcock, A descript. Catalogue Indian Deep-Sea Crustacea, Calcutta, 1901, p. 120 (teste W. T. Calman).
Aegeon propensalata Stanley Kemp, in: Records Indian Museum, Vol. XII, Part VIII, Calcutta 1916, p. 377.
Illustrations of the Zoology of the "Investigator", Plate XLI, figs. 6, 6*a*.

Stat. 47. April 8/12. Bay of Bima, near south fort. 55 m. Bottom mud with patches of fine coral sand. 1 male.

Unfortunately the abdominal pleura of the typical *Pontocaris propensalata* have not been described by Spence Bate. According to Dr. Calman, who was enabled to compare co-types of *Aegeon medium* with the type of Bate's *P. propensalata* (Stanley Kemp, l. c.),

these two species are identical and, the abdominal pleura of *A. medium* being truncated inferiorly ("Illustrations", l. c.), we may draw the conclusion that they are also truncated in the type of *A. propensalata*. In the specimen from the Bay of Bima the abdominal pleura are truncated and show the same characteristic form as in *A. medium*; also as regards the carination of the carapace this specimen agrees with this species, but, as there are in other respects some slight differences, it is considered as a new variety, for which the name of *hilarula* is proposed.

The male (Fig. 71, 71*a*, 71*b*) is probably young, for, measured in the middle line, the carapace appears to be 7,7 mm. long, the abdomen 18 mm., the entire length 25,7 mm. from tip of rostrum to tip of telson, whereas the male of *A. propensalata* attains a length of 34 mm. The triangular rostrum (Fig. 71*c*) that reaches only to the middle of the eyestalks, ends at the tip in two small teeth, that are separated by a triangular notch; the inner margin of each tooth runs parallel with the outer margin of the other. The tooth on either side of the base of the rostrum is rather small, not larger than the teeth at the apex; the distance (0,56 mm.), measured in the middle line, between the line uniting the two teeth at the base and that which unites the apices of the two apical teeth, is one-fifth shorter than the distance between the tips of the two teeth at the base and the latter nearly 5-times as long as the distance between the tips of the two apical teeth. The rostrum of *A. propensalata* is not cleft at the tip and has a larger spine on either side of the base.

The processes, with which the median, dorsal and lateral carinae of the carapace are armed, are obtuse, blunt. The median carina consists of eight processes, that are moderately prominent and of which the posterior is a little longer than the rest; the tubercles of the dorsal carinae, on each side of the middle, are more prominent, 8 on the left, 9 on the right and the four, respectively five posterior tubercles are smaller than the five, respectively four anterior. Orbital margin with two fissures, spine at the outer angle almost as long as the rostrum. The large tooth or spine (Fig. 71*d*) at the anterior extremity of the lateral carina extends as far forward as the distal extremity of the basal antennular article and runs straight forward with the tip slightly outwards; behind it are two obtuse teeth of which the anterior is shorter, though more prominent than the posterior; the 7 or 8 processes of the posterior moiety of the lateral crest are little prominent, especially the 4 or 5 posterior, and the anterior extremity is obtuse. The serration of the supra-marginal carina, finally, is very obscure, like in the Challenger type (Stanley Kemp, l.c.), so that Spence Bate even described it as smooth; the 11 or 12 processes, by which it is composed, become, however, perceptible when the carapace is looked at obliquely from behind and the anterior extremity is blunt, little prominent. Branchiostegal angle subacute, reaching as far forward as the eyes. Last three thoracic sterna sharply carinated in the middle line.

The sculpturing of the abdomen is well-developed, prominent and resembles that of *A. media*, except that there is no broad sinuous ridge on either side of the middle line of the 2nd somite and extending obliquely throughout its length, but, like in *A. pennata* (Bate), two tubercles separated by a vertical furrow that reaches to near the median crest. The posterior sculptured part of the 2nd tergum (Fig. 71*c*) appears, measured in the middle line, hardly half as long as that of the 3rd, whereas it appears distinctly longer in

A. propensalata, according to the figure 6 of the "Illustrations". The abdominal pleura fully resemble those of *A. propensalata* ("Illustrations", fig. 6*a*).

The 1st pair of legs are furnished with a well-developed exopodite.

The 2nd legs (Fig. 71*f*) are short and project only by the fingers beyond the carpal articulation of the hand of the anterior pair; the carpus (1,4 mm.), which is slender and 7-times as long as thick at its distal extremity, is hardly longer than the chela (1,32 mm.), which is almost 5-times as long as broad (0,28 mm.) near the articulation of the fingers; the fingers (0,62 mm.) are nearly as long as the palm (0,7 mm.). The 2nd legs therefore much agree with BATE's figures 2 and 3 (l. c.), but in the figures 6 and 6*a* of the "Illustrations" (l. c.), they reach much farther forward, the chela appears longer than the carpus and the fingers shorter in proportion to the palm.

The 3rd legs are setaceous and extend by the dactylus and half the propodus beyond the forwardly extended propodus of the 1st pair; the dactylus appears half as long as the propodus, which is as long as the merus, whereas the carpus is a little longer. When *A. media* is indeed identical with *A. propensalata* (Bate), the 3rd legs appear in the figures 6 and 6*a* of the "Illustrations" of a too stout shape and the carpus appears not longer than the merus or propodus; unfortunately in BATE's figure 3 the boundaries between dactylus and propodus like between merus and ischium have not been indicated.

Geographical distribution of the typical *A. propensalata* (Bate): Botany Bay (WHITELEGGE); Kei-islands (BATE); Andaman Sea (ALCOCK).

3. *Aegeon Sibogae* de Man. (Pl. XXIV, Fig. 72—72*f*).

Aegeon Sibogae J. G. de Man, in: Tijdschr. d. Nederl. Dierk. Vereen. (2) Dl. XVI, Afl. 2 and 3, 1918, p. 302.

Stat. 15. March 15. 7° 2'.6 S., 115° 23'.6 E. Bali Sea, south of Kangeang. 100 m. Bottom fine coralsand. 1 female without eggs.

Aegeon Sibogae belongs to that Section of the genus, in which the hepatic groove is well-defined, and, the abdominal pleura being not truncated inferiorly, appears closely related to *A. pennata* (Bate) and its variety *affinis* (Alcock).

Measured in the middle line, the carapace proves to be 13,3 mm. long, the abdomen 31,7 mm., entire length 45 mm.; the body, 4,6-times as long as the 2nd somite is wide, appears comparatively a little wider than the ovigerous female of *A. pennata* (Bate) from Stat. 306, that has nearly the same size. Rostrum triangular (Fig. 72, 72*a*, 72*b*), reaching to the middle of basal antennular article and to the cornea of the eyestalks; to the naked eye and even when using a feeble magnifying-glass, the apex appears simple and subacute, under the microscope, however, it proves to end in two extremely minute teeth, of which the tips are only 0,06 mm. distant from one another. Like in *A. pennata* a conical tooth stands on either side at the base; the length (1,44 mm.) of the line uniting the apices of these two teeth is just one and a half as long as the distance (0,96 mm.) between the tip of the rostrum and that line, measured in the middle; the two basal teeth are rather large, measuring one-fifth the distance between the tip of the rostrum and the base of these teeth. The carapace which is 13,3 mm. long and 11,5 mm.

wide in the middle, is a little wider than that of the female of *A. pennata*, in which these numbers are 12,5 mm. and 10 mm. The 1st or median carina and the 2nd or dorsal carinae differ not from those of *A. pennata*, the median carina is composed of 10 teeth or tubercles, the left dorsal of 8, the right of 9; all are rather prominent and sharp, though decreasing in size and prominence from before backward. The huge, wing-like and sharp spine at the anterior extremity of the lateral carina reaches to the level of the middle of the 3rd antennular article; this spine is but slightly turned outward, much less than in *A. pennata*, so that the distance, 10,75 mm., between the apices is even a little smaller than the greatest width of the carapace in the middle. Orbital spine nearly as long as the rostrum. Behind the terminal spine and the deep cervical groove the lateral carina is armed with two teeth, of which the anterior is sharp and reaches almost to the level of the orbital margin, while the posterior is much smaller and subacute. The posterior moiety of the lateral crest resembles that of *A. pennata* (Bate) var. *affinis* Alcock (Illustrations Zoology "Investigator", Plate LI, fig. 3), it ends anteriorly in a sharp tooth behind which to the posterior margin occur 5 smaller ones; the 1st or anterior is also sharp, but the following are obtuse. In the typical *pennata* one observes usually but one trifling tooth behind the sharp spine at the anterior extremity. The supra-marginal carina, which in *A. pennata* is smooth, appears in *A. Sibogae* distinctly serrate by 13 or 14 processes, that are all obtuse excepting the anterior which is acute; the processes are small, little prominent. Branchiostegal spine acute, reaching as far forward as the huge anterior spine of the lateral carina. The antepenultimate thoracic sternum (Fig. 72*c*) is armed in the middle with a strong, laterally much compressed tooth, the sharp tip of which is curved forward. A similar, but much smaller and hardly compressed tooth occurs on the penultimate sternum, but the posterior sternum is smooth, without any trace of carination, though the anterior boundary appears slightly thickened, just in the middle.

The abdomen is sculptured exactly after the same pattern as that of *A. pennata*, but the sculpturing is much more prominent. Like in *A. pennata*, on either side of the median crest of the 2nd somite (Fig. 72*d*), that ends anteriorly in a curved tooth, occur two tubercles, which are separated by a deep vertical furrow. The two submedian carinae of the 5th somite are entire and terminate posteriorly in a small sharp tooth, whereas they are armed in *A. pennata* with a small acute tooth just behind the middle. The tergum of the 6th somite is a little broader in proportion to its length and the two submedian carinae are therefore a little more remote from one another; each is trispinose, the posterior spine being a little longer than the two anterior. The abdominal pleura resemble those of *A. pennata*, but the lower apex is less sharp, on the 1st and 2nd subacute, on the following rather blunt.

Eyepeduncles a little smaller than those of *A. pennata*. Antennulae and antennae like in this species.

The external maxillipeds project by their terminal joint beyond the tip of the antennal peduncle and have a less slender form than those of *A. pennata*. The peraeopods of the 1st pair that bear a short setose exopodite, differ from those of *A. pennata* by their stouter shape (Fig. 72*e* and Fig. 70*c*); in the ovigerous female of *A. pennata* the chela without the dactylus is 7,5 mm. long and 1,9 mm. broad in the middle, in the type of *A. Sibogae*, however,

7 mm. long and 2,3 mm. broad, so that in the latter the propodus is only three-, in *A. pennata* four-times as long as broad. Like the propodus, also the dactylus has a less slender form. A sharp spine occurs at the far end of the outer margin of the merus.

The 2nd peraeopods (Fig. 72*f*) are longer than those of *A. pennata* and show also different measurements. These legs project by the chela and half the carpus beyond the carpal articulation of the chela of the 1st pair; the carpus (4,5 mm.) is a little more than one and a half as long as the chela (2,75 mm.) and the fingers that are a little gaping, are nearly half as long as the palm, the chela, finally, is a little slenderer, 6-times as long as broad.

The setaceous peraeopods of the 3rd pair reach with the dactylus beyond the propodus of the anterior legs, the relative measurements of the joints are the same as those of *pennata*, but they are a little less slender. The two posterior legs present no differences.

4. *Aegeon Sibogae*, var. *intermedia* de Man. Pl. XXIV, Fig. 73, 73*a*.

Aegeon Sibogae var. *intermedia* J. G. de Man, in: Tijdschr. d. Ned. Dierk. Vereeniging, (2) Dl. XVI, Afl. 2 and 3, 1918, p. 303.

Stat. 302. Febr. 2. 1900. 10° 27'.9 S., 123° 28'.7 E. Strait between the islands of Rotti and Timor. 216 m. Bottom sand and coral sand. 1 female without eggs.

The carapace of this female is 11,7 mm. long, the abdomen 28,3 mm., entire length 40 mm.; the body appears nearly 5-times as long as the 2nd somite is wide. The rostrum is a little less broad at base in proportion to its length than in the typical specimen from Stat. 15 and the apex is obtuse, though perhaps damaged. Carapace like in the type, but the huge, wing-like spine at the anterior end of the lateral crest is much more turned outward, as much as in *A. pennata* and a line uniting the apices runs along the middle of 2nd antennular article; the serration of the supra-marginal carina is rather obtuse, though the 13 or 14 prominences are still perceptible.

The antepenultimate thoracic sternum (Fig. 73) is armed in the middle line with the same, acute, compressed tooth as in the type; the penultimate and the posterior sterna are, however, both sharply carinated, but the dentiform distal extremities of these two carinae do not project upward.

The abdomen agrees with the typical species except the 3rd tergum. From the anterior extremity of the median crest (Fig. 73*a*) an oblique carina runs backward on either side of it and this carina curves without interruption into the subtransverse crest near the posterior margin: in the typical *A. Sibogae*, however, the oblique carina is separated by an interruption from the subtransverse crest.

The peraeopods agree with the typical form, the 1st pair bears also a short, setose exopodite, but the carpus of the 2nd pair is hardly one and a half as long as the chela.

5. *Aegeon Rathbuni* de Man. Pl. XXIV and XXV, Fig. 74—74*b*.

Egeon orientalis M. J. Rathbun, in: U. S. Fish Commission Bulletin for 1903, Part III, Wash. 1906, p. 911, Pl. XXIII, fig. 3 (nec *Aegeon orientalis* Henderson).

Aegeon Rathbuni J. G. de Man, in: Tijdschr. d. Ned. Dierk. Vereeniging, (2) Dl. XVI, Afl. 2 and 3, 1918, p. 304.

Stat. 89. June 21. Pulu Kaniungan Ketjil. 11 m. Bottom coral. 1 male.

The characters, mentioned by Miss RATHBUN, are sufficient to distinguish this species from *A. orientalis* Henderson, about which STANLEY KEMP has lately furnished useful information (STANLEY KEMP, in: Records Indian Museum, Vol. XII, Part VIII, Calcutta 1916, p. 378). The photograph in Miss RATHBUN's paper is unfortunately not clear, so that new figures are given and she also not made mention of the length. The male from Stat. 89 (Fig. 74, 74*a*) is 28 mm. long, the rostral spines included (carapace 8 mm., abdomen 20 mm.). The two conical, subacute teeth in which the rostrum (Fig. 74*b*) ends anteriorly and which are separated by a broad interspace, reach to midway the short eyestalks; on either side at the base a somewhat smaller spine occurs. The distance (0,5 mm.) between the line, long 0,72 mm., uniting the tips of the two basal teeth and the line uniting those of the two apical teeth, is only one-fourth longer than the distance (0,4 mm.) between the apices of the two anterior teeth. Of the 5 spines of the median carina the middle one is the smallest. First or upper lateral carina 7-spined, second armed on the left side with 9, on the right with 8 spines, third on the left side with 5, on the right with 6 spines, including the antero-lateral spine; the spines of the 2nd and 3rd row diminish in size posteriorly.

Antepenultimate thoracic sternum armed with a strongly compressed tooth, the acute tip of which is directed forward; the two last thoracic sterna are sharply carinated and the carina terminates anteriorly in a small sharp tooth.

The abdomen agrees also with Miss RATHBUN's description, the following may still be added. The upper surface of the median crest on the 2nd somite is slightly grooved longitudinally, the median crests on the 3rd and 4th are flattened above, finely punctate, that of the 4th shows moreover an oval impressed point near the anterior extremity and this carina ends posteriorly in a sharp tooth. Submedian crests of 5th somite entire. Telson 6,2 mm. long, little shorter than the carapace and hardly more than one-fifth the entire length; it is a little longer than the uropods, deeply grooved longitudinally and the lateral margins of the upper surface are furnished with two pairs of microscopic spinules, of which the anterior pair is placed just in front of the middle, the posterior nearly at the posterior fourth.

The pleuron of the 1st somite is truncated inferiorly with rounded posterior margin; of the two lateral carinae on each side of the 2nd somite the lower forms the boundary between tergum and pleuron, like on the 5th and as also does the lower of the three carinae of the 4th somite; the pleuron of the 2nd is bluntly angulated or almost rounded inferiorly and from each of its rounded lateral margins an obtuse ridge runs backward respectively forward and curving downward; 3rd and 4th pleura truncated with rounded, posterior margin; 5th pleuron rounded and armed posteriorly with 2 small spines, of which the larger upper is placed on the level of the upper lateral carina.

First abdominal sternum with a rather small, compressed tooth in the middle line, the acute apex of which is directed forward; 2nd with a similar tooth, though smaller; following with a still smaller and obtuse tooth.

Cornea of the eyes black. Stylocerite acute. Antennular peduncle reaching about to the middle of the antennal scale; scaphocerite hardly longer than broad with the terminal spine large, reaching just beyond the lamella.

First pair of legs probably without exopodite, upper margin of the merus with a short spine at the far end. The legs of the 2nd pair extend to the middle of the propodus of the 1st, carpus a little longer than the merus and than the chela, the latter nearly as long as the merus, fingers about half as long as the palm. Third legs setaceous, about as long as those of the 1st pair, carpus 3,4 mm. long, one and a half as long as the merus and almost $2^1/_2$-times as long as the propodus, dactylus two-fifths of the propodus. Dactylus of 4th and 5th pair lanceolate, narrow, a little shorter than the propodi.

General distribution: Hawaiian Islands (Ratiibun).

Sabinea Owen.

The genus *Sabinea* Owen, that differs from the other Crangonidae by the peraeopods of the second pair being simple, not chelate, was hitherto still unknown in the Indopacific: at present, however, science is indebted to the Siboga Expedition in the remarkable discovery of a new species of *Sabinea*, captured north of Tanah Djampeah Island in the Indian Archipelago. *Sabinea septemcarinata* (Sabine), the first described species of this genus, ranges in the Siberian Polar Sea from 170° 17′ E. westward to the Kara Sea, has been observed in the White Sea, the Murman Sea, the Barents Sea, on the eastern and western coasts of Finmark and in the seas of Spitzbergen, while it has also been taken at the Lofotes and farther south on the west coast of Norway; this species, however, occurs also on the east coast of North America from Massachusetts Bay to the St. Lawrence estuary, on the west coast of Greenland as far up as Discovery Bay at Grinnell Land, on the coasts of south and east Greenland, all round Iceland and near Jan Mayen. The second species, *Sabinea Sarsii* S. I. Smith, which is closely related, is distributed from the entrance to the White Sea along the Murman coast and the north and west coasts of Norway to the Skager Rak and the Shetland Islands; it has also been taken near the Færoes, all round Iceland and occurs on the east coast of North America from the Gulf of Maine and south of Halifax to Davis Straits. The third hitherto known representative of the genus *Sabinea*, *Sab. hystrix* (A. M.-Edw.), a large species attaining a length of 125 mm. from tip of rostrum to tip of telson, ranges from off the island of Guadeloupe, along the east coast of the United States, to Davis Straits and south-west of Iceland.

The indopacific species, finally, discovered by the "Siboga", the new *Sabinea indica*, approaches to *Sab. hystrix* by the shape of the acuminate rostrum reaching to beyond the 1st antennular article and likewise armed with an acute tooth at either side of the base, but it differs considerably from this and from the two other species by the much smaller number of spines on the carapace and by the smooth, unarmed abdomen.

Sabinea septemcarinata is found in rather shallow water, the greatest depth not surpassing 164 fathoms, though in the Bredefjord Sermilik, Southern Greenland, two specimens in a young stage were caught in 220 fathoms (Stephensen). According to Dr. Hansen *Sabinea*

Sarsii goes deeper down and has not been taken in less than 40 fathoms, while on the contrary it has been captured near the Færoes at a depth of 388. *Sabinea hystrix* was obtained off Guadeloupe at a depth of 734, off the east coast of the United States in water of 353—888, and south-west of Iceland even at 1912 fathoms; this species occurs thus at the greatest depth. *Sabinea indica*, finally, was taken from 218 fathoms upward.

Key to the known species of the genus *Sabinea* Owen.

a_1 Carapace at either side with three denticulated carinae; abdomen dorsally carinated.

b_1 Lateral margins of the rostrum unarmed.

c_1 Rostrum short, hardly overreaching the eyes and obtusely rounded at the tip; extremity of the telson subtruncated and armed with a series of eight or more spines or stout setae. . . *septemcarinata* (Sabine)

(S. I. Smith, in: Trans. Connecticut Acad. of Arts and Sciences, Vol. V, Part 1, 1879, p. 57, Pl. XI, figs. 5, 9—13).

c_2 Rostrum reaching distinctly beyond the eyes and appearing acutely pointed, when looked at from above; telson terminating in an acute tip, with one or two spines each side. . . . *Sarsii* S. I. Smith

(S. I. Smith, l. c., p. 59, Pl. XI, figs. 6—8.)

b_2 Lateral margins of the rostrum armed proximally with a sharp spine. Rostrum acute, as long as the antennal scales or longer.

Telson regularly tapering to the tip, which is acute, unarmed and naked. . . . . *hystrix* (A. M.-Edw.)

S. I. Smith, in: Bulletin Mus. Comp. Zool. Cambridge, Vol. X, N° 1, 1882, p. 38, Pl. VIII, figs. 1—1*b*.)

Carapace at either side with two keels, the upper unarmed, the lower with two spines.

Abdomen smooth, not carinated, excepting the 3rd somite, the tergum of which is produced posteriorly to a distinctly compressed carina or gibbosity.

Rostrum acute, lateral margins armed proximally with a sharp spine. *indica* de Man

1. *Sabinea indica* de Man. Pl. XXV, Fig. 75—75*l*.

Sabinea indica J. G. de Man, in: Tijdschr. Nederl. Dierk. Vereen., (2) Dl. XVI, Afl. 2 and 3, 1918, p. 304.

Stat. 65a. May 6. Very near Station 65 (7° 0′ S., 120° 34′.5 E.). North of Tanah Djampeah Island. From 400 m. Bottom pale, grey mud, changing during haul into coral bottom. 1 female without eggs.

Measured in the middle line, the carapace (Fig. 75), rostrum included, proves to be 12,5 mm. long; the abdomen, about 35 mm., is nearly 3-times as long, entire length 47,5 mm. The carapace shows its greatest width of 7,2 mm. midway between the apex of the posterior spine in the

mid-dorsal line and the posterior border, while the spiniform antero-lateral angles are 6,7 mm distant from one another; the carapace is therefore but little more than one and a half as long as wide and, the greatest height, above the 2nd pair of peraeopods, being as large as the greatest width, it shows a rather stout shape. The rostrum, 3,5 mm. long, is a little more than one-third as long as the rest of the carapace (Fig. 75 *a*) and reaches slightly beyond the far end of basal antennular article; the distal half of the upper border is curved upward, the acute tip reaches, however, not to the level of the gastric spine and, while the proximal half of the upper border is rounded, the distal half appears carinated. At either side of the base the rostrum is armed with a slender acuminate spine, that extends as far forward as the eye; the two spines are slightly directed outward and the distance, 0,84 mm., between their apices measures about one-fourth the length of the rostrum. From each spine a sharp carina runs forward on the lateral surface of the rostrum and curves towards the tip, which it does not reach and the curved, carinated, lower border is fringed with feathered setae.

In the dorsal median line the carapace is armed with two large, strongly compressed and acute spines; measured in the middle line the distance between the apex of the anterior or gastric spine from the orbital margin proves to be one-tenth the distance between the orbital and the posterior margin of the carapace. The slightly concave, carinated, upper margin of the gastric spine extends to the posterior or cardiac spine, while the carinated upper margin of the latter is curved and reaches to near the posterior border of the carapace; the anterior margin of the cardiac spine is a little shorter than that of the gastric and both spines are larger than the rostral spines. The distance, 3,9 mm., between the apices of the two spines is almost one-third the length of the carapace, rostrum included. Orbital spine directed obliquely upward, small, reaching not so far forward as the eye or the rostral spine. Post-antennal spine acute, directed also obliquely upward and reaching a little beyond the level of the eyes, about to the distal third of the rostrum. The infero-lateral border of the carapace is strongly curved; an elevated ridge or carina runs from the obtuse antero-lateral angle, just below the post-antennal spine, close to and parallel with it, to just behind the middle and from here unites with the infero-lateral border itself. The lateral sides of the carapace bear each two carinae, of which the upper is unarmed, the lower bispinose. The rounded upper carina runs on the level of the orbital spine, almost twice as far distant from the infero-lateral than from the upper border of the carapace, the dorsal spines included; this keel begins near the posterior border and reaches, slightly curved and with the concave side turned towards the upper border, hardly beyond the middle of the carapace. The lower keel is formed by two acute spines, placed immediately behind one another, almost in the same plane; the anterior spine, nearly 3-times as long as the posterior, reaches to just beyond the tip of the gastric spine and the distance, 1,62 mm., between the two lateral spines measures about one-fifth the length of the carapace, without the rostrum and measured in the middle line. From the posterior spine the little prominent and rounded keel runs backward, but fades away at the posterior third of the carapace; in front of the anterior spine the keel also soon disappears. This keel is separated from the gastric region by the distinct, though shallow, hepatic groove, which is traceable to near the orbital margin; a shallow groove is also visible between the anterior lateral and the post-antennal spine.

Inferior apices of branchiae turned backward.

First somite of the abdomen smooth. On the tergum of the second a posterior triangular area appears a little elevated with regard to the larger anterior remaining part; this triangular area is bounded by the posterior margin and anteriorly by two finely crenulated lines, that run from just behind the middle of the tergum with a curve backward and downward, passing into the posterior margin of the pleura. The distance between the posterior margin of the carapace and that of the 2nd tergum is just as long as the length, 7,5 mm., of the 3rd tergum, when we measure in a lateral view the distance between the anterior and posterior extremities of the upper border in a straight line. The 3rd tergum, rounded anteriorly, is produced and elevated posteriorly to a distinctly compressed carina or gibbosity, which in a lateral view appears regularly curved; the upper border is rounded transversely, smooth, hardly punctate, shining and distinctly set off from the slightly concave, finely and closely punctate, lateral parts; on account of this gibbosity the posterior margin of the 3rd somite projects a little backward, though it is rounded. The upper border of this crest widens regularly from before backward and a transverse line or depression at the anterior fourth of the tergum seems to separate this anterior part from the crest. The smooth and rounded 4th somite measures a little more than half the length of the 3rd. Fifth somite a little shorter than 4th, smooth, posterior margin concave; from each lateral extremity a shallow groove runs forward, that separates the tergum from the pleuron, though it fades away on the middle. Sixth somite a little longer than 4th, flattened above and terminating at either side of the posterior margin in an acute spine.

Different from the three other species of this genus the abdominal pleura are smooth, unarmed and resemble much those of *Crangon crangon* (Linné), the anterior and posterior margins being rounded or obtuse.

Telson (Fig. 75*b*) 8,5 mm. long, one-fourth the length of the abdomen and a little more than one and a half as long as the 6th somite; anterior third of upper surface grooved, the rest rounded; there are two pairs of minute lateral spinules, that are easily overlooked, and the spinules of each pair are not implanted in the same transverse line; a third pair occur at the posterior end of the lateral margins and besides these the acuminate tip (Fig. 75*c*), which is almost one and a half as long as broad at base, bears at either side a longer spine, close to the minute spinule and reaching as far backward as the apex. Inner uropod a little shorter than telson, outer uropod slightly shorter than the inner, truncated at the tip and without diaeresis.

Eyes well-developed, not contiguous, globular, greatest diameter nearly one-seventh the length of the carapace, rostrum included; the corneal portion, that occupies by far the greatest part of the ophthalmopod, is distinctly faceted by small facets and the pale upper part of the eye is surrounded by blackish pigment, except at the inner side, while the outer and lower part are also of a light pale colour.

The antennular peduncle reaches until the middle third part of the antennal scale; looked at from below the basal joint appears a little longer than the 2nd and 3rd combined and it is armed, immediately behind the middle of its lower border, with a small, forwardly

directed spine, while in front of this spine the lower border is sharply carinated. Second joint nearly quadrate, hardly longer than broad, 3rd half as long as 2nd; inner flagellum half as long as the carapace, rostrum included, outer flagellum a little shorter and less broad than inner. Stylocerite terminating in a long and acuminate spine that reaches to the far end of basal article.

Basal antennal article sharply carinated above, near the stylocerite; the carina runs forward about to the middle and from here obliquely outward to the anterior margin; outer spine triangular, acute, reaching to the level of the far end of basal antennular article. Antennal peduncle reaching to just beyond the middle of the antennal scale; the latter, the terminal spine included, is 7,4 mm. long, three-fifths the length of the carapace, and 3,7-times as long as broad in the middle; the unarmed, straight, outer margin ends in a long, forwardly directed spine, long 0,85 mm., one-ninth the entire length of the scale, and almost 3-times as long as broad at its base; distal margin of the lamella truncated, nearly as long as the spine.

The external maxillipeds reach almost to the truncated distal end of the antennal scales, terminal joint as long as penultimate, antepenultimate joint reaching to the far end of basal antennular article.

The 1st pair of peraeopods (Fig. 75*d*, 75*e*) reach with the propodus to the far end of the scaphocerite and bear apparently no exopodite. The coxopodite is armed at the antero-external angle with a small, acute, tooth, while the inner margin is fringed with setae. The sharply carinated, upper margin of the strongly laterally compressed merus ends in a long acute spine, that reaches to the far end of the carpus; the lower margin is also sharply carinated from the proximal end to a little beyond the middle and this rather prominent carina is lamelliform and terminates in a small, sharp tooth. The upper margin of the outer surface of the carpus ends distally in a well-developed, slender spine and another broader spine, though of the same length, occurs at the far end of the lower margin, two smaller acute teeth exist moreover on the distal border of the upper surface. Chela without the dactylus 5,7 mm. long, almost half the length of the carapace and 1,7 mm. broad in the middle, the propodus being 3,35-times as long as broad in the middle.

The very short peraeopods of the 2nd pair (Fig. 75*f*, 75*g*) hardly reach to the middle of the merus of the 1st. The merus, 1,4 mm. long, is 7-times as long as thick and almost twice as long as the carpus, that measures 0,84 mm.; a seta, 0,36 mm. long, is implanted at the distal extremity of the latter, behind it a shorter one is observed and a still shorter seta exists near the far end of the lower margin. The propodus is 0,6 mm. long and 3-times as long as broad; on the lower margin of this joint two long setae are implanted in the middle, not far from and behind one another, of which the anterior is 0,72 mm. long, the other a little shorter, and three equally long setae occur at the far end, one also at the far end of the upper margin; probably also on the middle of this margin two long setae will prove to occur, opposite to those of the lower margin. Dactylus long 0,27 mm. and 0,12 mm. broad, the margins run parallel like those of the preceding joint and are glabrous; the rounded extremity of the dactylus bears four long pectinated setae, of which the inner pair are 0,58 mm. resp. 0,68 mm. long, the two external 0,48 mm.

Only the third leg of the right side is partly preserved; it is very thin, filiform, like in the other species.

Like in the genus *Pontophilus* the peraeopods of the 4th and 5th pair are of a much stouter shape than those of the 3rd, but in this species these two posterior legs are subequal, both as regards the length and the thickness of the joints. The legs of the 4th pair (Fig. 75*h*) project by the dactylus and two-fifths of the propodus beyond the truncated tip of the antennal scale, those of the last pair only by half the dactylus. The merus, carpus, propodus and dactylus of the 4th pair are respectively 6 mm., 4 mm., 4,5 mm. and 1,7 mm. long, those of the 5th pair 5,8 mm., 4,2 mm., 4,6 mm. and 2,1 mm. The upper border of the merus of the 4th pair terminates distally in a small spine and in both pairs there is a tuft of setae at the far end of the propodi, but for the rest these legs are smooth and glabrous. Dactyli of the 4th pair nearly two-fifths of the propodus, those of the 5th slightly longer; the dactyli are nearly styliform, hardly compressed, slender, tapering to the acute tip, with a tuft of short setae near the latter.

The antepenultimate sternum is obtusely carinated in the middle line anteriorly and produced into a vertically compressed tooth or spine which, gradually narrowing, reaches to the 2nd joint of the anterior legs; the lateral margins of this tooth are slightly raised, so that the surface appears a little concave; the tip seems to be broken off and has perhaps been acute.

The outer branch of the pleopods of the 1st pair (Fig. 75*i*) is 3,8 mm. long, one and a half as long as the protopod, 3,2-times as long as broad in the middle, and fringed on both margins with long, articulated, feathered setae; the inner branch, 2,7 mm. long and 6-times as long as broad, is much shorter and, while the exopodite shows its greatest width in the middle and narrows to both extremities, especially to the distal one, the inner branch shows nearly the same breadth along its whole length, being only narrowed near the base and the distal extremity is broadly rounded; the margins are also fringed with long feathered setae, which, however, are not articulated, but, besides these, the inner margin is moreover adorned along its whole length with long, winding, flexible hairs that are not articulated nor feathered. These long flexible hairs occur also on the inner border of the protopod (Fig. 75*j*), except in the middle, while this border is moreover fringed with long, feathered setae. In the female of *Sabinea septemcarinata* the inner branch is comparatively shorter and the filamentous appendages much less numerous (C. Spence Bate, Report Challenger Macrura, Pl. XC, fig. 1*p*).

In a full-grown, ova-bearing female, long 80 mm., of *Sab. septemcarinata* (Sabine) from the Barents Sea, which was examined by me, the exopodite of the 1st pleopod proved to be 9 mm. long, the endopodite 5,2 mm., so that the latter was comparatively shorter than in *Sab. indica*; the endopodite, 1 mm. broad, much resembled that of this species, but the distal extremity decidedly narrows to the obtuse tip, so that the latter is not broadly rounded.

The two branches of the 2nd pleopod are of the same length, but the inner appears in the middle a little less broad; they have the usual lanceolate form, narrowing distally, and both margins are fringed with feathered, articulated setae; the stylamblys (Fig. 75*k*, 75*l*) measures nearly one-third the length of the inner branch, which is 3,4-times as long as broad

(the outer branch 3-times), and the stylamblys, which is 5-times as long as thick, is armed at the inner side of its obtuse extremity with about 20 cincinnuli, while 6 or 7 feathered setae are implanted on the inner margin, the outer being glabrous; the inner border of the protopod, finally, is also fringed with long, feathered setae which are not articulated. In the following pleopods the branches gradually diminish in breadth and the stylamblys in length.

Prionocrangon W.-Mas.

The remarkable genus *Prionocrangon* W.-Mas. includes only three species, of which the first described, *Prion. ommatosteres* W.-Mas., occurs in the Bay of Bengal off the Ceylon coast and in the Andaman Sea, while a male was obtained by the "Siboga" east of the island of Saleyer and a female in the northern part of the Strait of Makassar. The second species, *Prion. Dofleini* Balss, is recorded from the Sagami Bay, Japan, while the third, *Prion. pectinata* Faxon, is found in the West-Indies, off Martinique.

All the species occur in deep water. *Prion. ommatosteres* was taken by the "Siboga" at Stat. 88 at a depth of 711 fathoms, the greatest depth at which this genus has been observed; this species, however, was obtained off the Ceylon coast also between 200 and 350 fathoms.

Key to the known species of the genus *Prionocrangon* W.-Mas.

a_1 When the carapace is looked at from above, the rostrum appears much shorter than the transformed eyestalks.
Telson considerably shorter than the uropods, abruptly contracted behind the middle. Carapacial carina with 8 teeth. . . . . *pectinata* Faxon
(W. Faxon, in: Bull. Mus. Compar. Zoology. Vol. XXX, N° 3, 1896, p. 157, Plate II, figs. 4—7.)

a_2 When the carapace is looked at from above, the rostrum appears almost or just as long as the transformed eyestalks.

b_1 Carapacial carina 6—8-toothed.
Rostrum rather short . . . . . *ommatosteres* W.-Mas.

b_2 Carapacial carina 10—12-toothed.
Rostrum rather long . . . . . *Dofleini* Balss
(H. Balss, Ostasiatische Decapoden. II. München 1914, p. 71, fig. 42.)

1. *Prionocrangon ommatosteres* W.-Mas. Pl. XXV, Fig. 76—76*i*.

Prionocrangon ommatosteres J. Wood-Mason, in: Ann. Mag. Nat. Hist. 6th Ser., Vol. 8, Nov. 1891, p. 362.
Prionocrangon ommatosteres A. Alcock & A. R. Anderson, in: Journal Asiatic Soc. Bengal, Vol. LXIII, Part II, N° 3, 1894, p. 152.
Prionocrangon ommatosteres A. Alcock, A descript. Catal. Indian Deep-Sea Crustacea, Calcutta 1901, p. 123.
Illustrations of the Zoology of the Investigator, Crustacea, Pl. IX, fig. 4.

Stat. 88. June 20. 0° 34′.6 N., 119° 8′.5 E. Northern part of the Strait of Makassar. 1301 m. Bottom fine grey mud. 1 adult female, without eggs.

Stat. 211. Sept. 25. 5° 40′.7 S., 120° 45′.5 E. East of Saleyer Island. 1158 m. Bottom coarse grey mud, superficial layer more liquid and brown. 1 adult male.

It is with some doubt that these specimens are referred to *Prion. ommatosteres*, the first described of the three species of this genus, at present known. The figure 4 in the "Illustrations", however, seems to be inaccurate. According to ALCOCK's description of 1901 the median carina of the carapace extends to within a short distance of the posterior border, in the figure, however, to hardly beyond the middle; the telson should be scarcely as long as the 6th abdominal somite, in the figure it is not shorter than it; the 4th pair of legs, finally, are described as a good deal longer than the 5th pair, in the figure the latter are but little shorter.

Both in *Prion. pectinata* FAXON from off Martinique and in *Prion. Doflcini* BALSS from Japan the eyepeduncles are present, transformed in FAXON's species "into a pair of closely apposed trihedral processes, with acute and somewhat divergent tips", in the latter in two tapering and pointed stalks, placed on either side of the rostrum and closely apposed ("als dünn zugespitzte Stiele dicht nebeneinander"). In the present specimens (Fig. 76*a*) one observes, like in *Prion. pectinata* (W. FAXON, in: Bull. Mus. Comp. Zoology, Vol. XXX, N° 3, 1896, Pl. II, fig. 5), on either side of the rostrum a triangular process with acute tip, of which both the outer margin and the upper surface are a little concave, while the two inner borders are at their base probably contiguous, but they soon diverge, so that the apices are somewhat remote from one another. Different, however, from the west-indian species, in the present specimens the two processes are hardly longer than the rostrum, when the carapace is looked at from above. In the last description of *Prion. ommatosteres*, that of 1901, the eyestalks are apodictically said to be wanting or "represented by a pair of microscopic tubercles on the anterior edge of the exposed anterior somite". In the figure 4 of the "Illustrations" neither the described triangular process, the transformed eyestalk, nor the pointed stylocerite of our specimens are visible, but, the figure being apparently inaccurate, these two processes are perhaps omitted.

Rostrum triangular, acuminate, obliquely ascendant; when looked at from above, the rostrum appears but little longer than broad at base, while its length proves to be in the male one-ninth, in the female one-tenth the distance, in the middle line, between the tip and the posterior margin of the carapace, the rostrum being in both specimens 0,84 mm. long. The median carina is armed in the female with 6, in the male with 8 forwardly directed teeth and reaches in the former to the posterior fourth, in the latter about to the posterior fifth of the carapace; in the male the 1st or anterior tooth is slightly larger than the rest and the 5th is very small, while the 6 others are equal, but the 5th tooth is perhaps damaged; the distances between the tips of the three posterior teeth are a little longer than those between the others; this is also the case in the female, but the 1st tooth is here scarcely larger than the rest.

Orbital spine small, acute, reaching not so far forward as the rostrum. Antero-lateral angle of the carapace spiniform, reaching farther forward than the rostrum and fringed with feathered setae as in *Prion. Doflcini*.

The abdomen, which is 3-times as long as the carapace, agrees with Fig. 4 of the "Illustrations", the lower margin of the 2nd pleura appears slightly concave in both specimens. Telson (Fig. 76*b*) in both specimens a trifle longer than the 6th somite, abruptly contracted just in front of the middle; the upper surface is slightly concave from the posterior extremity almost to the anterior, the infero-lateral margins of the anterior widened part are slightly sinuate and the lateral parts of the telson are also concave, the concavity reaching from the middle of the widened part to the posterior extremity. The telson which is slightly curved longitudinally, appears a little shorter than the uropods when these are directed straight backward and when the terminal spines of the telson are not included; when these spines are included, it appears in the female just as long as the uropods, in the male not yet. The tip (Fig. 76*c*) of the telson, which is rounded though with a small acute spine in the middle, is namely armed with four slender spines of equal length, that are 0,8 mm. long, nearly one-sixth the length of the telson; one observes moreover on the lateral margins of the upper surface three pairs of very small spinules, the anterior pair just in front of the contraction, the 2nd a little farther from the anterior pair than from the tip, the 3rd pair, finally, on the posterior extremities of these margins, so that the tip is, properly speaking, armed at either side with three spines, two of which are very long, the third very small. The telson of *Prion. pectinata* Faxon is much shorter with regard to the uropods, broader in proportion to its length and contracted behind the middle, the telson of the third species, *Prion. Dofleini*, finally, has not been described.

In the male the antennular peduncle, measured from the orbital margin, appears nearly as long as the carapace, rostrum included and measured in the middle line, though not longer; in the female it measures only three-fourths the length of the carapace. The 1st joint is more than 3-times as long as the 2nd and 3rd taken together, the 2nd slightly longer than the 3rd; the outer flagellum is in the male nearly as long as the peduncle, though not shorter and thicker than in the female, in which more than half the length is broken off; the much thinner, inner flagellum measures in the male about two-thirds the outer. Stylocerite acute, reaching as far forward as the spiniform antero-lateral angle of the carapace.

The antennal peduncle extends in the male to the distal extremity of the 2nd antennular article, in the female to the middle of 3rd; the long and narrow scale reaches in the male just beyond the far end of the 1st antennular article, in the female to that of 2nd and measures in the male two-thirds the length of the carapace, while in the female it is little more than half that length.

The external maxillipeds reach in the male to the middle of 3rd antennular article, but in the female by half their terminal joint beyond the antennular peduncle; exopodite small, hardly reaching to the middle of the antepenultimate joint.

The 1st pair of legs, the dactylus excluded, extend in the male (Fig. 76*d*) to the far end of 1st antennular article, in the female almost to that of 2nd, appearing in both as long as the antennal scale. The stout 2nd legs (Fig. 76*e*) reach in both specimens to the middle of the propodus of the 1st pair and to the middle of the antennal scale, the slender 3rd legs (Fig. 76*f*) are as long as the external maxillipeds both in the male and the female, the strong legs of the 4th pair (Fig. 76*g*) reach to the tip of the propodus of the 1st, the legs, finally, of the 5th

pair (Fig. 76*h*, 76*i*), that are considerably shorter, reach just beyond the far end of the merus of the 4th and to the distal extremity of the carpus of the 2nd.

In the 1st pair of pleopods of the male the endopodite is rudimentary, measuring only one-fourth the length of the exopodite; in the five following pairs the endopodite measures three-fourths the length of the outer branch, it is much less broad and bears in the 2nd pair a well-developed, styliform appendix masculina with 4 stout setae at the tip. In the 1st pair of pleopods of the female the endopodite is also rudimentary, in the three following it measures a little more than one-fourth and in the 5th pair nearly half the length of the exopodite.

The male is 30 mm. long, measured in the middle line from the apex of the rostrum to the tip of the telson, the terminal spines excluded, carapace 7,2 mm., abdomen 22,8 mm.; in the female these numbers are 36 mm., 8,3 mm. and 27,7 mm.

General distribution: Andaman Sea (Alcock); Bay of Bengal off the Ceylon coast (Alcock).

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EXPLANATION OF THE PLATES.

PLATE I.

Fig. 1—1*j*. *Pasiphœa propinqua* de Man. Type from Stat. 100. — 1 lateral view of carapace, etc. × 4; 1*a* lateral view of anterior part of carapace, × 11; 1*b* anterior part of carapace, × 11; 1*c* front and outer orbital angles, × 17; 1*d* anterior part of carapace, with the eyes, antennulae and scaphocerites, × 4; 1*e* posterior part of abdomen, × 3; 1*f* caudal fan, × 4; 1*g* extremity of telson, × 33 (only the fragments of three terminal spines are still present); 1*h* leg of 1st pair, × 4; 1*i* leg of 5th pair, × 4; 1*j* dactylus of this leg, × 17.

Fig. 2, 2*a*. *Pasiphœa Sivado* (Risso). Adult specimen from Nizza. — 2 front and outer orbital angles, × 17; 2*a* tip of telson, × 33.

Fig. 3—3*o*. *Pasiphœa* sp. *α*., young specimen from Stat. 148. — 3 front, outer orbital angles and post-frontal spine, looked at from above, × 50; 3*a* anterior part of carapace, lateral view, × 33; 3*b* posterior part of abdomen, × 17; 3*c* telson, × 33; 3*d* extremity of telson, × 100; 3*e* scaphocerite, × 25; 3*f* left leg of 1st pair, × 17; 3*g* right leg of 2nd pair, × 17; 3*h* spine on the basipodite of this leg, × 66; 3*i* spine of the merus of 2nd leg, × 66; 3*j* right leg of 3rd pair, × 17; 3*k* dactylus of this leg, × 66; 3*l* leg of 4th pair, × 33; 3*m* dactylus of this leg, × 66; 3*n* right leg of 5th pair, × 17; 3*o* dactylus of this leg, × 66.

Fig. 4—4*g*. *Pasiphœa* sp. *β*. Specimen, probably young, from Stat. 105. — 4 anterior part of carapace, with the eyes, antennular peduncles and right scaphocerite, × 33; 4*a* front and outer orbital angles, × 66; 4*b* lateral view of anterior part of carapace, × 50; 4*c* extremity of telson, × 66; 4*d* left scaphocerite, × 33; 4*e* the two last joints of 3rd outer maxilliped, × 33; 4*f* leg of 1st pair, × 20; 4*g* carpus of this leg, × 50.

J. G. de Man, del.

PLATE II.

Fig. 4*h*—4*p*. *Pasiphœa* sp. *β*. Specimen, probably young, from Stat. 105. — 4*h* leg of 2nd pair, × 20; 4*i* carpus of 2nd leg, × 50; 4*j* leg of 3rd pair, × 33; 4*k* dactylus of this leg, × 66; 4*l* leg of 4th pair, × 33; 4*m* propodus and dactylus of this leg, × 66; 4*n* one of the spines of the propodus of this leg, × 200; 4*o* leg of 5th pair, × 33; 4*p* dactylus of this leg, × 66.

Fig. 5—5*j*. *Pasiphœa* n. sp.? Specimen, probably young, from Stat. 141. — 5 lateral view of carapace, eye, antennula and antenna, × 11; 5*a* posterior part of abdomen, × 6; 5*b* left scaphocerite, × 17; 5*c* leg of 1st pair, × 6; 5*d* part of the merus of this leg with the only tooth, × 33; 5*e* leg of 2nd pair, × 6; 5*f* leg of 3rd pair, × 6; 5*g* leg of 4th pair, as far as present, × 6; 5*h* leg of 5th pair, × 6; 5*i* dactylus of this leg, × 33; 5*j* extremity of telson, × 33.

Fig. 6—6*l*. *Pasiphœa kaiwiensis* Rathb. Female from Stat. 316. — 6 front and outer orbital angles, × 17; 6*a* lateral view of the anterior part of carapace, eye etc., × 11; 6*b* the same seen from above, × 4; 6*c* posterior part of abdomen, × 3; 6*d* extremity of telson, × 33; 6*e* left scaphocerite, × 6; 6*f* leg of 1st pair, × 6; 6*g* leg of 2nd pair, × 6; 6*h* leg of 3rd pair, × 6; 6*i* leg of 4th pair, × 6; 6*j* dactylus of this leg, × 33; 6*k* leg of 5th pair, × 6; 6*l* dactylus of this leg, × 33 (the setae are not figured).

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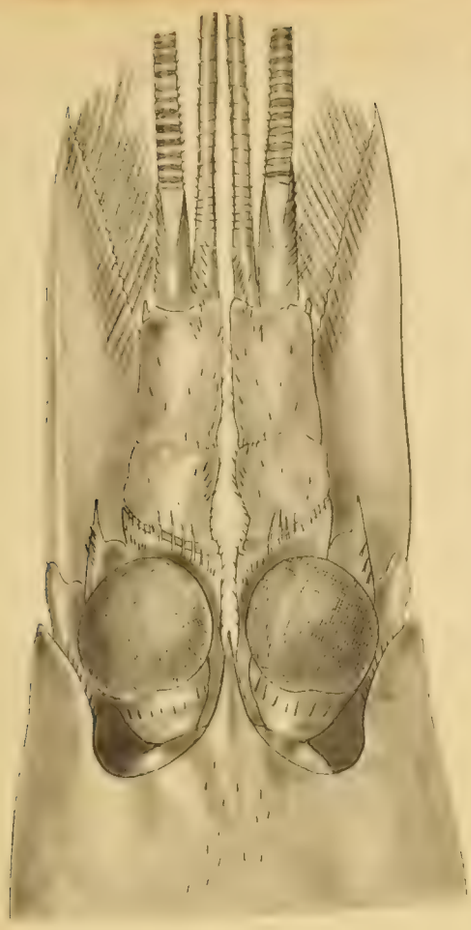
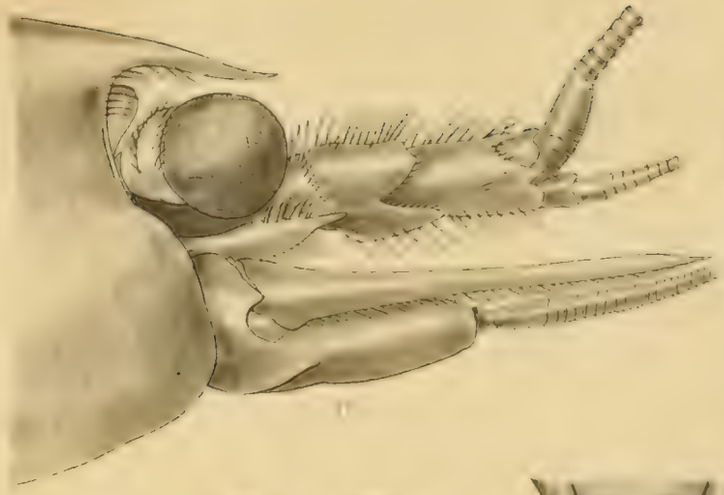
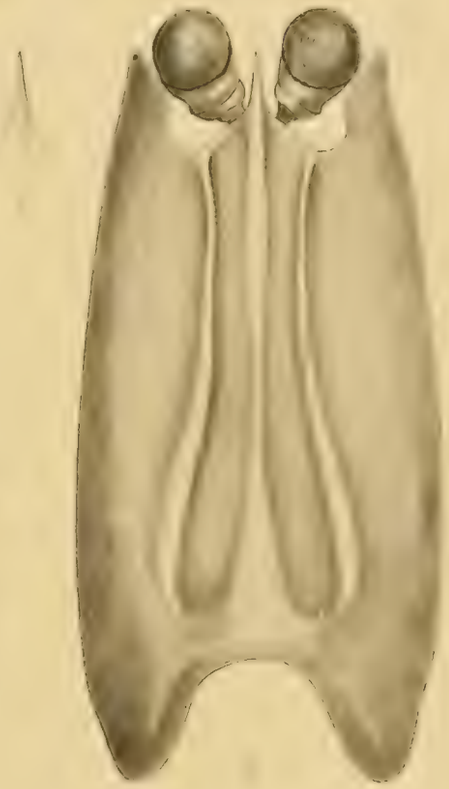
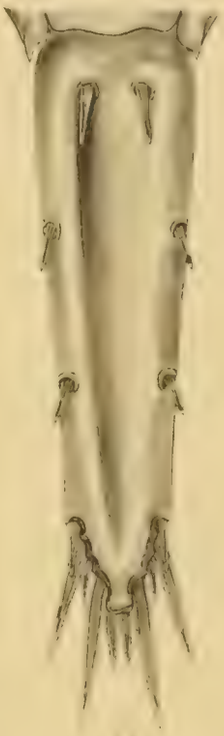
PLATE III.

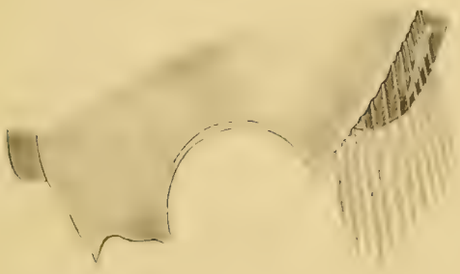
Fig. *7—7j*. *Leptochela robusta* Stimps. Excepting *7x* on Plate IV all the figures have been taken from an adult male or an adult, ova-bearing female captured at Stat. 153. — *7* anterior part of carapace, with the eyes and the two pairs of antennae of an adult male, × 17; *7a* rostrum of another specimen, × 17; *7b* lateral view of the same male, × 17; *7c* carapace and eyes of an adult female, × 11; *7d* posterior part of abdomen of this female, × 8; *7e* posterior part of 6th abdominal somite of this female, × 33 (the small spine on the lower surface, though partly covered by long feathered setae, is also visible); *7f* telson of this female, × 17; *7g* extremity of telson of this female, × 33; *7h* and *7h'* right and left mandible of this female, × 33; *7i* palp of the right mandible of this female, × 33; *7j* first maxilla of this female, × 33.











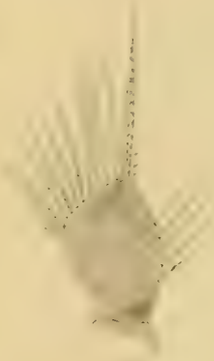


PLATE IV.

Fig. 7*k*—7*x*. *Leptochela robusta* Stimps. Excepting 7*x* all the figures have been taken from an adult ova-bearing female captured at Stat. 153. — 7*k* second maxilla of this female, × 17; 7*l* first maxilliped of this female, × 17; 7*m* endopodite of this first maxilliped, × 33; 7*n* second maxilliped of this female, × 17; 7*o* dactylus of this maxilliped, × 33; 7*p* third maxilliped of this female, × 11; 7*q* terminal joint of this maxilliped, × 25; 7*r* carpus and chela of the right first leg of this female, × 17; 7*s* part of the fingers of this chela, on the level of the 5th spinule on the outer border of the dactylus, × 107; 7*t* carpus and chela of the right leg of the 2nd pair of this female, × 17; 7*u* right leg of the 3rd pair of this female, × 17; 7*v* right leg of the 4th pair of this female, × 17; 7*w* right leg of the 5th pair of this female, × 17; 7*x* lateral view of the anterior margin of carapace of the young male, long 13 mm., from Stat. 166, × 33.

Fig. 8—8*d*. *Leptochela pugnax* de Man. — 8 lateral view of the anterior part of carapace of the adult male from Stat. 47, × 50; 8*a* sixth abdominal somite and part of fifth, of this male, × 33; 8*b* the two last joints of the left third maxilliped of the ova-bearing female from Stat. 258, × 50; 8*c* right leg of the second pair of this female, × 33; 8*d* left leg of the third pair of this female, × 33.

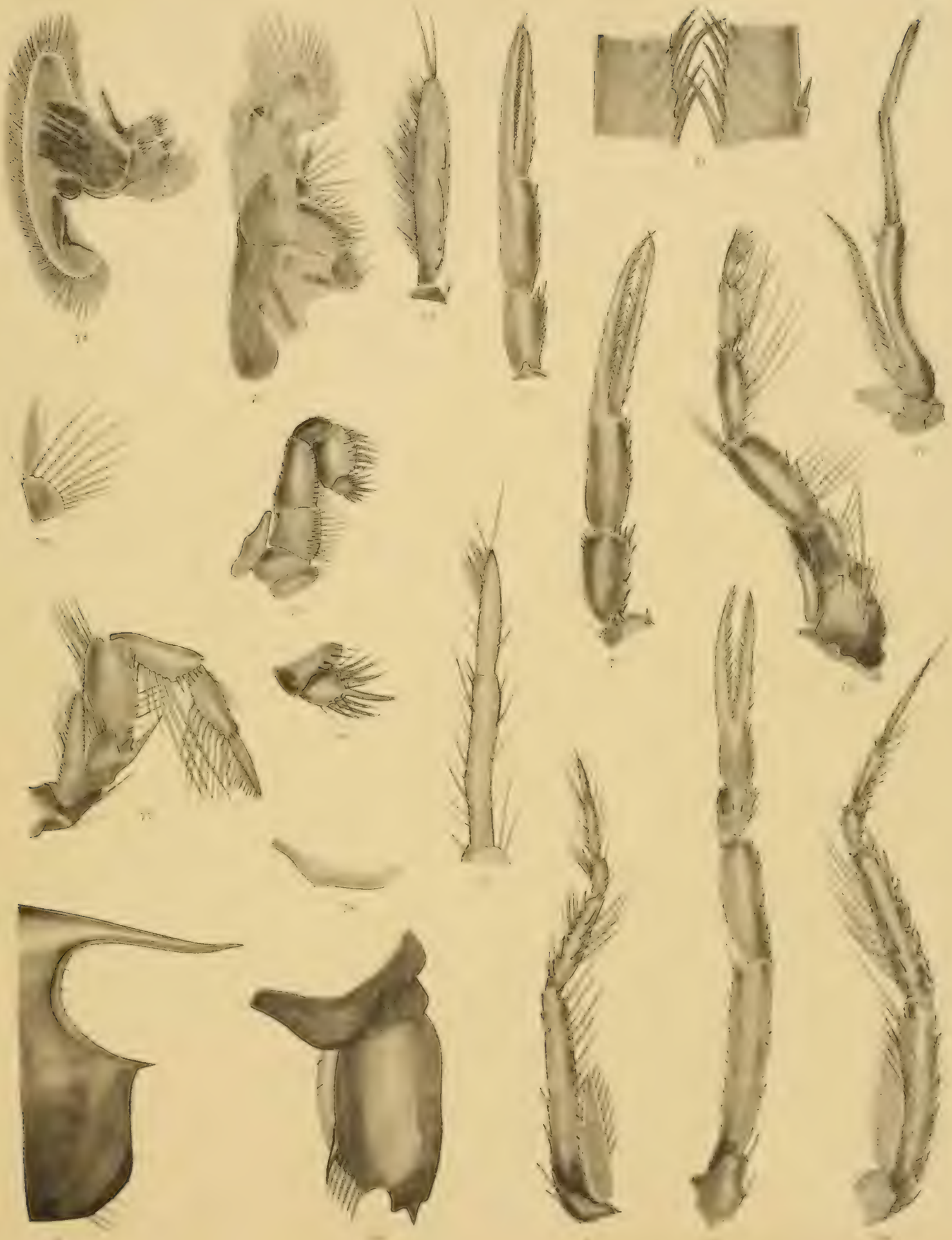


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PLATE V.

Fig. 9—9*h*. *Stylodactylus Amarynthis* de Man. — 9 egg-bearing female from Stat. 204, × 6⅔; 9*a* rostrum, × 20; 9*b* pleura of the first to fourth abdominal somites of the left side, × 20, *x* carapace, the feathered setae on the lower margin of the pleura are omitted; 9*c* telson, × 33; 9*d* tip of telson, × 75; 9*e* scaphocerite, × 20; 9*f* second maxilliped, × 33; 9*g* dactylus of third leg, × 50; 9*h* dactylus of fifth leg, × 50. (All the figures are taken from the egg-bearing female.)

Fig. 10—10*c*. *Stylodactylus Sibogae* de Man. — 10 the type from Stat. 95, × 27; 10*a* rostrum, × 40; 10*b* right peraeopod of the 3rd pair, from the inner side, × 27; 10*c* dactylus of this leg, × 66.

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PLATE VI.

Fig. 11—11*f*. *Systellaspis debilis* (A. M.-Edw.) var. *indica* de Man. All the figures are taken from the egg-bearing female, collected at Stat. 161. — 11 carapace and 1st abdominal somite, × 2; 11*a* third, fourth and fifth somite of the abdomen with the contiguous parts of the second and sixth, × 2; 11*b* postero-lateral margin of 4th, 11*c* of 5th somite, × 6; 11*d* peraeopod of 3rd pair, × 6; 11*e* proximal, 11*f* distal part of dactylus, × 12.

Fig. 12—12*c*. *Acanthephyra purpurea* A. M.-Edw. — 12 carapace and the three anterior abdominal somites of the almost full-grown male from Stat. 208, × 1½ (the carapace appears on this figure ⅔ mm. too long!); 12*a* rostrum of the specimen, long 17 mm., from Stat. 203, that belongs to the parva-stage, × 50; 12*b* rostrum of one of the two specimens from Stat. 230, long 20 mm., that also belongs to the parva-stage, × 50; 12*c* first, second and third abdominal somite of the young specimen, long 34 or 35 mm., from Stat. 230, in which the 3rd somite presents still the characteristic shape of the parva-stage, though the rostrum is already formed like in the adult.

Fig. 13—13*a*. *Acanthephyra armata* A. M.-Edw. — 13 telson of the adult male from Stat. 161, × 2; 13*a* extremity of telson of a male from Stat. 173, × 4.

Fig. 14—14*c*. *Acanthephyra media* Bate var. *obliquirostris* de Man. Male from Stat. 148. — 14 carapace, × 2; 14*a* telson, × 4; 14*b* and 14*c* eyepeduncle looked at respectively from above and from the outer side, × 6.

Fig. 15—15*b*. *Acanthephyra curtirostris* W.-Mas. — 15 the left eyepeduncle of the adult female from Stat. 217, × 8; 15*a* the right eyepeduncle of the adult male from Stat. 185, × 8; 15*b* the right eyepeduncle of the young specimen from Stat. 48. In the three figures the eyepeduncle is looked at from above.

Fig. 16. *Acanthephyra* sp. — Rostrum of the first specimen from Stat. 230, × 50.

PLATE VII.

Fig. 17—17*j*. *Acanthephyra (Meningodora) Sibogae* de Man. All the figures are taken from the two type specimens, collected at Stat. 210a. — 17 the smaller type specimen, × 2; owing to the mutilated condition of the specimen the two first abdominal somites are perhaps somewhat too short or inaccurately figured, while the length of 59 mm., indicated in the description for the whole body, is probably also a little incorrect; 17*a* rostrum of this specimen, × 4; 17*b* anterior part of carapace, with the eyes, antennulae and antennal scales, × 4; 17*c* extremity of telson, × 33; 17*d* mandible, × 17; 17*e* second maxilla, × 11; 17*f* first maxilliped, × 11; 17*g* second maxilliped, × 17; 17*h* peraeopod of 1st pair, × 11; 17*i* peraeopod of 2nd pair, × 11; 17*j* peraeopod of 3rd (or 4th) pair, × 11.

J. G. de Man, del.

PLATE VIII.

Fig. 18, 18*a*. *Nematocarcinus ensifer* (S. I. Smith) var. *producta* Bate. — 18 Lateral view of carapace etc. of the egg-bearing female from Stat. 227, × 2; 18*a* scaphocerite of this specimen, × 2.

Fig. 19—19*d*. *Nematocarcinus tenuirostris* Bate var. *Sibogae* de Man. — 19 Carapace etc. of the egg-laden female, long 140 mm., from Stat. 300, × 2; 19*a* scaphocerite of this female, × 2; 19*b*, 19*c* and 19*d* the two last joints of the legs of the 3rd, 4th and 5th pair of the female, long 119 mm., × 4.

Fig. 20—20*h*. *Nematocarcinus undulatipes* Bate. — 20 Lateral view of carapace and rostrum of the egg-laden female, long 104 mm. (N° 1 of the Table), from Stat. 262, × 4; 20*a*, 20*b* and 20*c* the two last joints of the 3rd, 4th and 5th leg of this female, × 4; 20*d* carapace and rostrum of another egg-bearing female from the same Station (N° 2 of the Table), × 4; 20*e* tip of telson of this specimen, × 33; 20*f*—20*h* carapace and rostrum of three other adult females from the same Station, × 4.

Fig. 21*a*—21*h*. *Nematocarcinus gracilis* Bate. — 21*a* anterior half of carapace and rostrum of the egg-laden female (N° 3 of the Table), from Stat. 262, × 6; 21*b* and 21*c* the two last joints of 3rd and 4th leg of this female (N° 3), × 6; 21*d* carapace and rostrum of the adult female from Stat. 300, × 4; 21*e* carapace and rostrum of the male (N° 1 of the Table) from Stat. 262, × 6; 21*f*, 21*g* and 21*h* the two last joints of the 3rd, 4th and 5th leg of this male, × 6.

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PLATE IX.

Fig. 21. *Nematocarcinus gracilis* Bate. — Carapace and rostrum etc. of the egg-bearing female (N° 2 of the Table) from Stat. 262, × 6 (the carapace, 17 mm. long, has been figured 6 mm. too short).

Fig. 22—22*o*. *Thalassocaris crinita* (Dana). — 22 adult ova-bearing female from Stat. 99, × 5; 22*a* rostrum of the adult male from Stat. 93, × 13; 22*b* pleura of the 1st and 2nd abdominal somite of the adult male from Stat. 93, × 17; 22*c* pleura of the 1st and 2nd abdominal somite of the adult female from Stat. 93, × 17; 22*d* fifth and sixth somite of the adult male from Stat. 93, × 17; 22*e* mandible, × 50; 22*f* mandibular palpus seen from above, × 50; 22*g* first maxilla, × 50; 22*h* second maxilla, × 33; 22*i* part of first left maxilliped, × 33; 22*j* endopodite and adjacent parts of the basipodite (b) and exopodite (a) of first maxilliped, viewed from the upper side, showing the lobe (c) of the endopodite, × 100; 22*k* last joints of second maxilliped, × 33 (the figures 22*e*—22*k* are taken from the adult male, which was collected at Stat. 282); 22*l* merus and parts of ischium and carpus of the left second leg of an adult ova-bearing female from Stat. 99, × 33; 22*m* leg of 3rd pair of the adult male from Stat. 282, × 17; 22*n* dactylus of this leg, × 50; 22*o* dactylus of 3rd leg of the ova-bearing female from Stat. 282, × 50.

Fig. 21 J. F. Obbes, Fig. 22-22a J. G. de Man, del.

PLATE X.

Fig. 23—23*c*. *Thalassocaris crinita* (Dana) var.? Largest male from Stat. 213. — 23 rostrum, × 17; 23*a* merus, carpus and parts of chela and ischium of the 2nd leg of this male, × 33; 23*b* leg of 3rd pair of this male, × 17; 23*c* dactylus of this leg, × 50.

Fig. 24—24*b*. *Plesionika martia* (A. M.-Edw.) var. *semilaevis* Bate. — 24 adult, full-grown male from Stat. 173, natural size; 24*a* male of medium size from Stat. 12, long 97 mm. (N° 6 of Table B), × 2; 24*b* young specimen from Stat. 316, long 96 mm., (N° 21 of Table B), × 2.

Fig. 25*a*—25*g*. *Plesionika longipes* (A. M.-Edw.) var. *indica* de Man. All the figures are taken from the adult ova-bearing female captured at Stat. 254. — 25*a* rostrum and the two anterior thirds of the carapace, × 2; 25*b* scaphocerite, × 2; 25*c* left, 25*d* right mandible, × 4; 25*e* other aspect of the right mandible, in which the molar process is looked at from above, × 4; 25*f* second maxilla, × 4; 25*g* second maxilliped, × 4.

PLATE XI.

Fig. 25. *Plesionika longipes* (A. M.-Edw.) var. *indica* de Man. The adult ova-bearing female captured at Stat. 254, natural size.

Fig. 26, 26*a*. *Plesionika Ortmanni* Dofl. — 26 male from Stat. 15, × 2; 26*a* dactylus of third leg, × 6.

Fig. 27—27*d*. *Plesionika Sindoi* (Rathb.). — 27 the adult, ova-bearing female from Stat. 105, × $2^2/_3$; 27*a* eyepeduncle of this female, × 4; 27*b* scaphocerite of this specimen, × $2^2/_3$; 27*c* dactylus of 4th, 27*d* of 5th leg of the same female, × 20.

Fig. 28*a*, 28*b*. *Plesionika unidens* Bate. — 28*a* anterior part of carapace with rostrum etc. of the adult female from Stat. 12, × 2; 28*b* third abdominal somite of this female from Stat. 12 with the characteristic tubercle on the upper border, × 4.

Fig. 29*c*—29*g*. *Plesionika assimilis* de Man. All the figures are taken from the adult female with eggs, captured at Stat. 51. — 29*c* scaphocerite, × 10; 29*d* last joints of first leg, × 25; 29*e* rudimentary chela of 1st leg, × 50; 29*f* last joint of carpus and chela of the longer or left leg of 2nd pair, × 25; 29*g* dactylus of 3rd leg, × 33.

Fig. 25, 26, 26a, 27-27d, 28a, 28b J. F. Obbes, Fig. 29c-29g J. G. de Man, del.

PLATE XII.

Fig. 27*c*. *Plesionika Sindoi* (Rathb.). — The male from Stat. 253, × 4.

Fig. 28. *Plesionika unidens* Bate. — Adult ova-bearing female from Stat. 65[a], × 2.

Fig. 29—29*b*. *Plesionika assimilis* de Man. All the figures are taken from the adult female with eggs, captured at Stat. 51. — 29 the whole animal, × 3; the fifth abdominal somite was in this specimen pushed into the fourth and appears therefore somewhat shorter than usual; 29*a* proximal part of rostrum, × 7; 29*b* eyepeduncle, × 10.

Fig. 30. *Plesionika binoculus* (Bate). — The largest female from Stat. 306, × 2.

Fig. 31—31*b*. *Plesionika bifurca* Alc. & Anders. — 31 full-grown, egg-laden female from Stat. 316, × $1^1/_3$; 31*a* caudal fan of this female, × 2; 31*b* tip of the telson of the same specimen, × 6.

Fig. 32—32*d*. *Parapandalus Zur Strasseni* Balss. All the figures are taken from the male captured at Stat. 185. — 32 carapace and rostrum, × 4; 32*a* distal part of rostrum, × 33; 32*b* lateral view of anterior part of carapace, × 13; 32*c* right scaphocerite, × 10; 32*d* two last joints of 2nd maxilliped, × 33.

Fig. 33*a*, 33*c*—33*e*. *Parapandalus spinipes* (Bate). All the figures are taken from the adult female without eggs, captured at Stat. 251. — 33*a* proximal third part of rostrum, × $2^2/_3$; 33*c* posterior half of abdomen, looked at from above, × 2; 33*d* terminal part of propodus and dactylus of third, 33*e* of fifth peraeopod, × 6.

Fig. 34*a*, 34*c*. *Parapandalus serratifrons* Borr. All the figures are taken from the egg-bearing female (N° 5 of the Table of measurements), captured at Stat. 306. — 34*a* proximal fourth part of rostrum, × $2^2/_3$; 34*c* posterior half of abdomen, looked at from above, × 2.

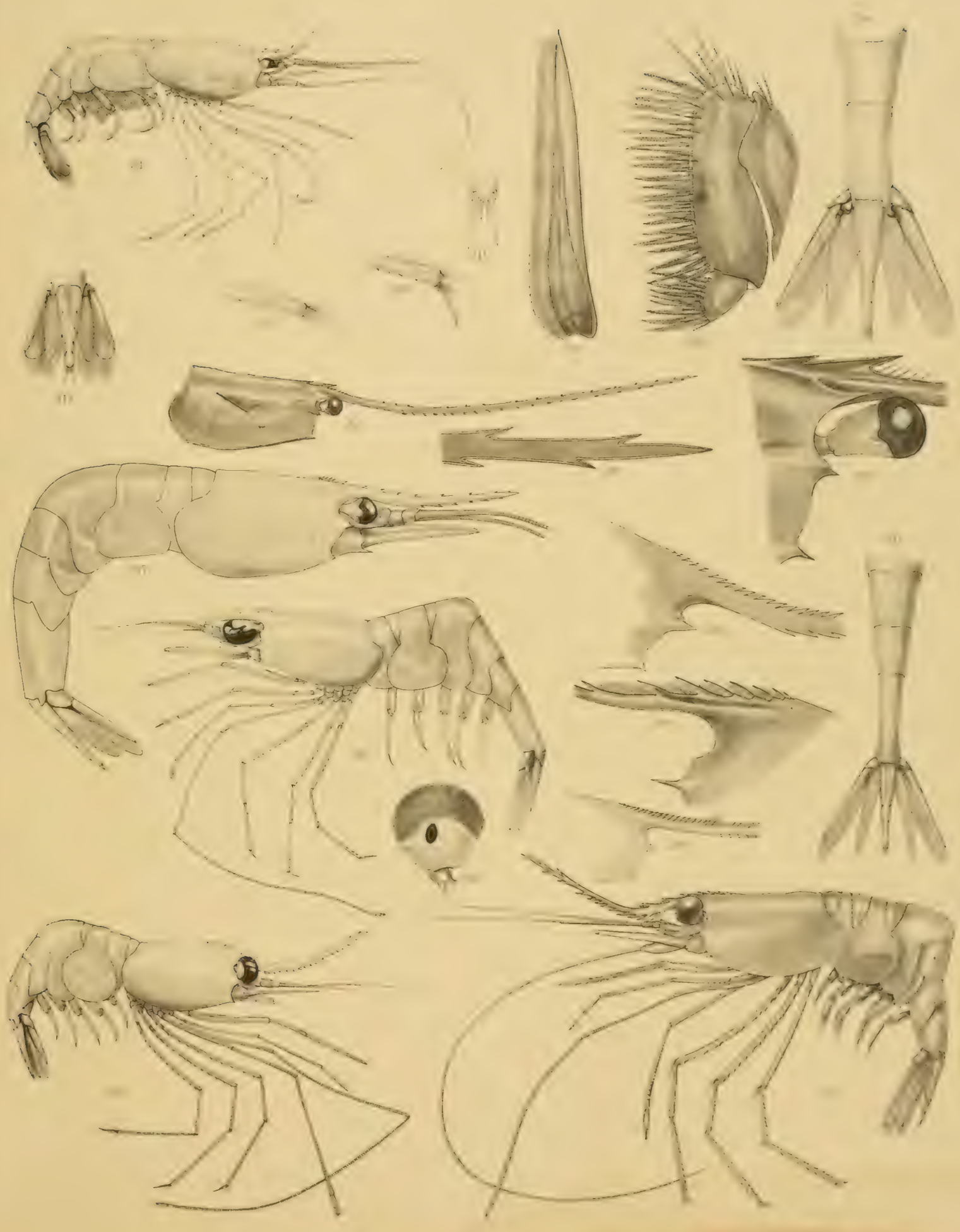

PLATE XIII.

Fig. 33, 33*b*. *Parapandalus spinipes* (Bate). The figures are taken from the adult female without eggs, captured at Stat. 251. — 33 the whole animal, natural size; 33*b* posterior half of abdomen, × 2.

Fig. 34, 34*b*, 34*d*, 34*e*. *Parapandalus serratifrons* Borr. All the figures are taken from the egg-bearing female (N° 5 of the Table of measurements), captured at Stat. 306. — 34 the whole animal, × $1^1/_3$; 34*b* posterior half of abdomen, looked at laterally, × 2; 34*d* dactylus of third, 34*e* of fifth leg, × 33.

Fig. 35, 35*a*. *Parapandalus pristis* (Risso). Adult ova-bearing female, long 98 mm., from off Barcelona. — 35 dactylus of fourth, 35*a* of fifth peraeopod, × 33.

Fig. 36—36*c*. *Heterocarpus Wood-Masoni* Alcock. — 36 adult ova-bearing female from Stat. 74, natural size; 36*a* fifth and sixth abdominal somite and tail-fan of this female, × 2; 36*b* the other younger female from Stat. 74, natural size; 36*c* carapace, rostrum etc. of an ova-bearing female from Stat. 256, being N° 22 of the Table of measurements, natural size.

Fig. 37—37*b*. *Heterocarpus laevigatus* Bate. Male from Stat. 215a. — 37 scaphocerite, × 2; 37*a* the three last joints of 3rd leg, × 2; 37*b* terminal part of propodus and dactylus of this leg, × 6.

Fig. 38*a*—38*d*. *Heterocarpus tricarinatus* Alcock & Anderson. Adult male from Stat. 208. — 38*a* third abdominal somite, × 2; 38*b* scaphocerite, × 2; 38*c* the three last joints of the right leg of 3rd pair, × 2; 38*d* terminal part of propodus and dactylus of this leg, × 6.

Fig. 33, 33ᵇ, 34, 34ᵇ, 36-36ᶜ, 37-37ᵇ, 38ᵃ-38ᵈ J. F. Obbes. Fig. 34ᵈ, 34ᵉ, 35, 35ᵃ, J. G. de Man del.

PLATE XIV.

Fig. 38. *Heterocarpus tricarinatus* Alcock & Anderson. Adult male from Stat. 208. — 38 carapace, rostrum etc., × 1 1/3.

Fig. 39—39*g*. *Heterocarpus gibbosus* Bate. — 39 carapace and rostrum of the egg-bearing female from Stat. 12, × 1 1/3; 39*a* the same of a young specimen from Stat. 38, × 1 1/3; 39*b* the same of a full-grown male from Stat. 74, × 1 1/3; 39*c* the same of an ova-bearing female from Stat. 256, × 1 1/3; 39*d* the same of a young specimen from Stat. 262, × 1 1/3; 39*e* scaphocerite of a male from Stat. 256, × 2; 39*f* the three last joints of third leg of this male, × 2; 39*g* dactylus of this leg, × 6.

Fig. 40—40*c*. *Heterocarpus lepidus* de Man. Female without eggs from Stat. 215a. — 40 the whole female, natural size; 40*a* scaphocerite of this female, × 2; 40*b* the three last joints of third leg, × 2; 40*c* dactylus of this leg, × 6.

Fig. 41—41*b*. *Heterocarpus ensifer* A. M.-Edw. var. *parvispina* de Man. — 41 the larger adult male from Stat. 254, × 1 1/3; 41*a* the three last joints of third leg, × 2; 41*b* dactylus of this leg, × 6.

Fig. 42—42*i*. *Heterocarpus Sibogae* de Man. — 42 adult ova-bearing female from Stat. 12, natural size; 42*a* carapace with rostrum and the two first abdominal somites of an adult male from the same Station, × 1 1/3; 42*b* young specimen from Stat. 38, natural size; 42*c* carapace with abnormal rostrum of the full-grown ova-bearing female from Stat. 139, natural size; 42*d* third leg of a male from Stat. 12, × 2; 42*e* dactylus of this leg, × 6; 42*f* third leg of a female from Stat. 12, × 2; 42*g* dactylus of this leg, × 6; 42*h* third leg of a young specimen from Stat. 74, × 2; 42*i* dactylus of this leg, × 6.

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PLATE XV.

Fig. 43—43*g*. *Heterocarpus dorsalis* Bate. — 43 carapace and rostrum of an adult female without eggs from Stat. 38, natural size; 43*a* scaphocerite of this female, × 2; 43*b* abdomen without telson, but with a part of the carapace, of an adult male, from Stat. 314, × $1^{1}/_{3}$; it shows distinctly the small tubercle near the posterior margin of the carapace; 43*c* first abdominal somite of this male with the four rounded tubercles, × 2; 43*d* right leg of 3rd pair of this male, × 2; 43*e* last two joints of this leg, × 6; 43*f* carapace and rostrum of the egg-bearing female from Stat. 300, natural size; 43*g* carapace and rostrum of an adult male from Stat. 316, natural size.

Fig. 44—44*f*. *Heterocarpus (Heterocarpoides) levicarina* (Bate). All the figures are taken from an adult ova-bearing female, captured at Stat. 312. — 44 the whole female, × $2^{2}/_{3}$; 44*a* second maxilla, × 10; 44*b* the two last joints of 1st peraeopod, × 17; 44*c* ischium of 2nd peraeopod, with the four curved spines near the middle of the lower margin, × 17; 44*d* these spines more magnified, × 33; 44*e* carpus and chela of 2nd peraeopod, × 17; 44*f* leg of 3rd pair, × 17 (in this figure 44*f* the propodus has wrongly been figured quite straight, it is, however, indeed slightly curved).

Fig. 45, 45*a*. *Chlorotocella gracilis* Balss. — 45 base of rostrum and anterior border of carapace of the larger specimen from Stat. 164, × 33; 45*a* part of fourth and fifth abdominal somite of this specimen, × 33.

Fig. 46—46*c*, 46*e*. *Chlorotocus spinicauda* de Man. — 46 full-grown egg-laden female from Stat. 51, × 4; 46*a* mandible, × 37; 46*b* mandibular palpus looked at from above, × 37; 46*c* first maxilla, × 37; this figure shows the characteristic notch or incision on the middle branch (the single seta at the upper angle of the palp was lost); 46*e* terminal joint of the endopodite of the second footjaw, × 37. (The four last figures were taken from the male, captured at Stat. 204).

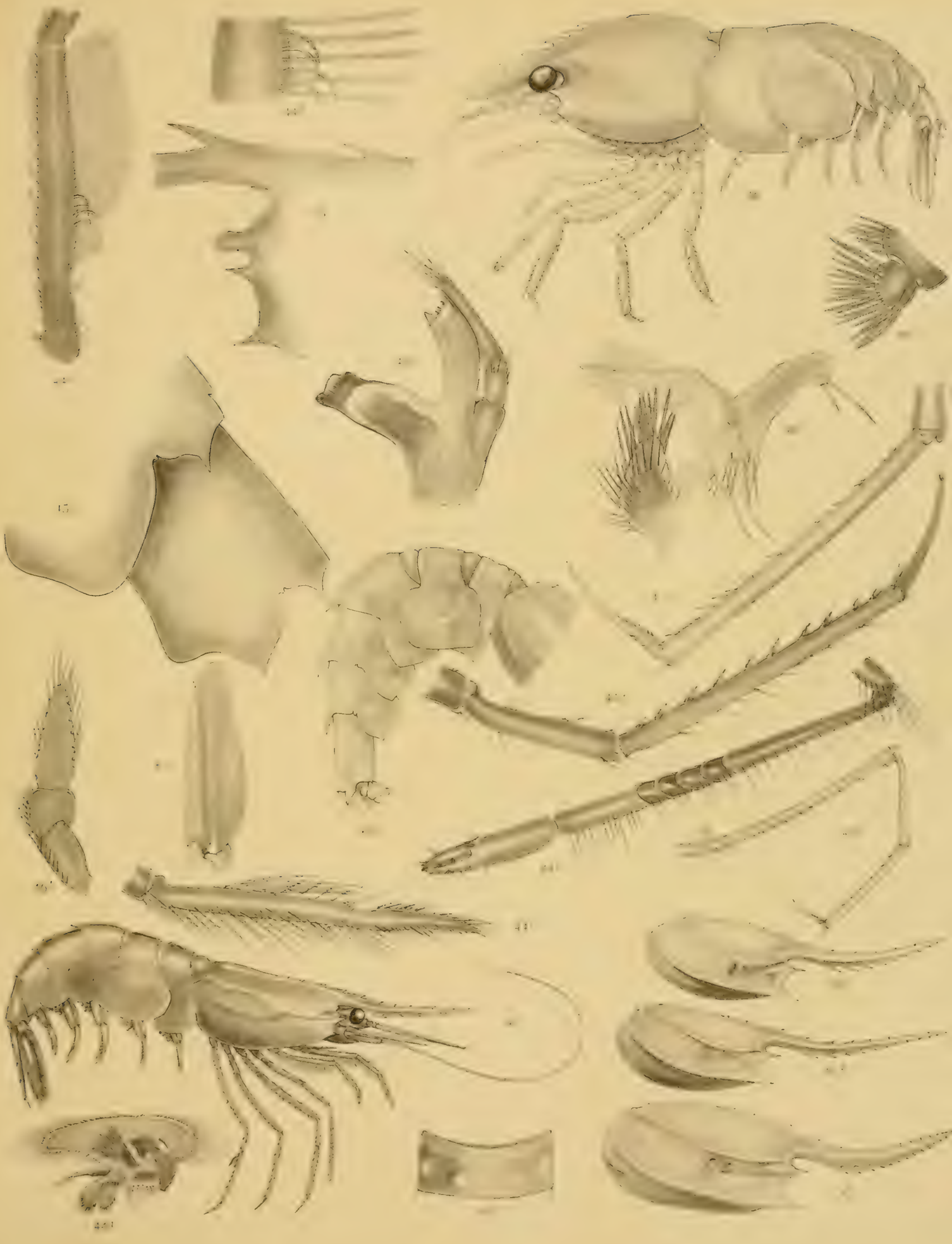


Fig. 43-43g, 46 J. F. Obbes. Fig. 44-44f 45, 45a, 46a-46c, 46e J. G. de Man, del.

PLATE XVI.

Fig. 46*d*. *Chlorotocus spinicauda* de Man. — Second maxilliped of the male from Stat. 204, × 22.

Fig. 47, 47*a*. *Psalidopus Huxleyi* W.-Mas. — 47 the whole animal, natural size; 47*a* terminal joint of the external maxilliped, × 8.

Fig. 48—48*e*. *Gnathophyllum fasciolatum* Stimps. — 48 telson of the larger female from Stat. 181, × 17; 48*a* tip of this telson, × 33; 48*b* right external maxilliped of this female, × 17; 48*c* right peraeopod of the 2nd pair of a male from Stat. 181, × 10; 48*d* fingers of this leg, × 33; 48*e* dactylus of the left fifth peraeopod of the larger female from Stat. 181, × 33.

Fig. 49. *Hymenocera elegans* Heller. — Caudal fan of the female from Stat. 220, × 17.

Fig. 50—50*j*. *Nikoides Sibogae* de Man. — 50 anterior part of carapace with the eyes etc. of the larger female from Stat. 274, × 10; 50*a* lateral view of this anterior part, with the left eye, × 10; 50*b* rostrum of this specimen, × 33; 50*c* extremity of the rostrum of this female, × 133; 50*d* telson of this female, × 20; 50*e* extremity of this telson, × 66; 50*f* tip of scaphocerite of the same specimen, × 50; 50*g* right, 50*h* left peraeopod of the 1st pair of this female, × 10; the left bears the exopodite, which in the right peraeopod was broken off; 50*i* tip of telson of the specimen from Stat. 71, × 66; 50*j* tip of scaphocerite of this specimen, × 50.

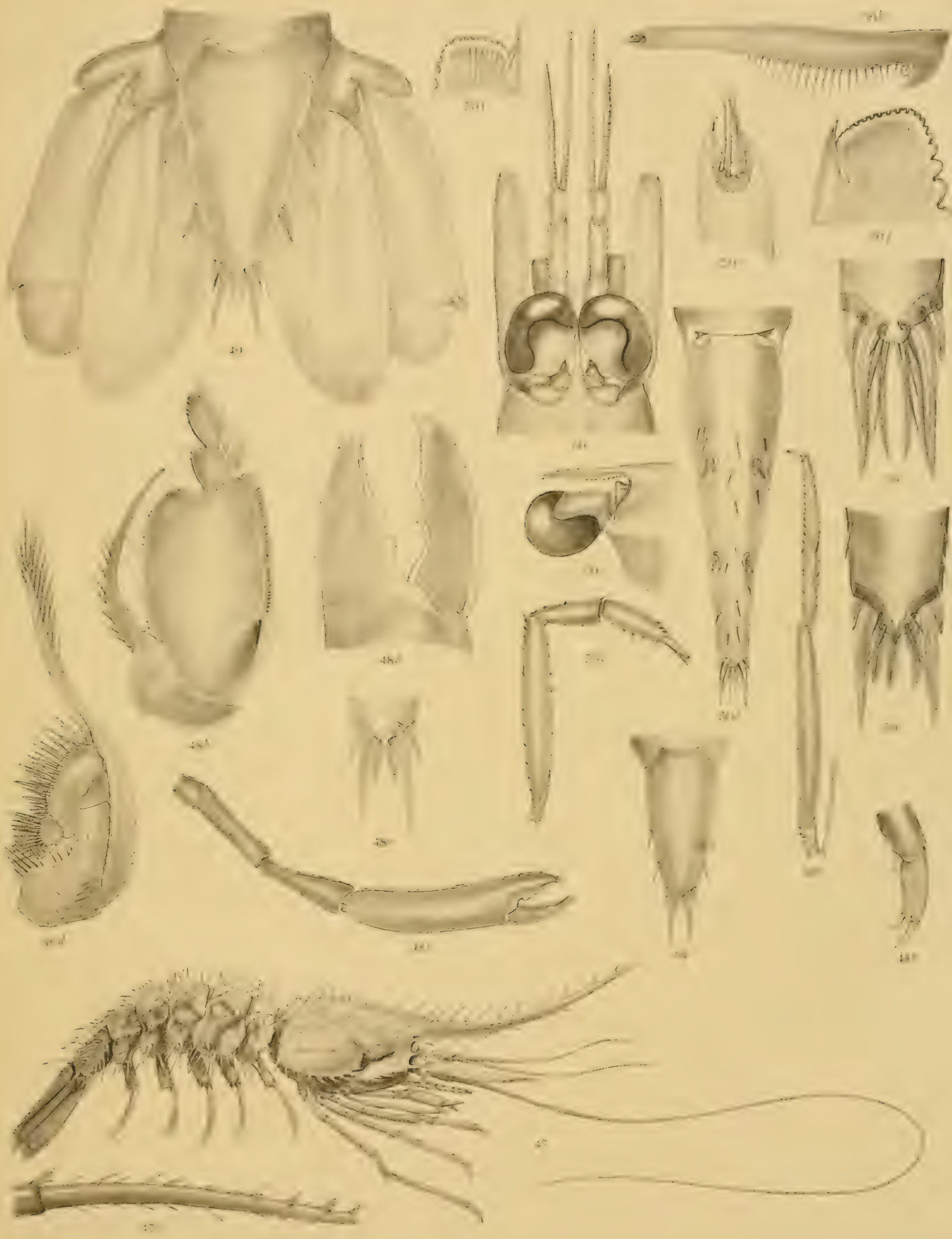


Fig. 46*d*, 48-48*e*, 49, 50-50*f* J. G. de Man, Fig. 47, 47*a* J. F. Obbes, del.

PLATE XVII.

Fig. 51—51*m*. *Processa australiensis* Baker. — 51 anterior part of the body of the full-grown, ova-bearing female from Stat. 273, × 17; 51*a* lateral view of the anterior part of carapace of this female, × 33; 51*b* extremity of rostrum of this specimen, × 100; 51*c* lower border of the pleuron of the 5th abdominal somite of this female, × 66; 51*d* telson of the same specimen, × 17; 51*e* tip of telson of an egg-bearing female from Stat. 71, × 66; 51*f* apex of scaphocerite of the female from Stat. 273, × 66; 51*g* and 51*h* right and left peraeopod of 1st pair of this female, × 17; 51*i* and 51*j* carpus and chela of the right, respectively left peraeopod of the 2nd pair of this female, × 33; 51*k* pleopod of the 2nd pair of the male from Stat. 7, × 33; 51*l* stylamblys and appendix masculina of this pleopod, × 66; 51*m* tip of stylamblys of this pleopod, × 320.

Fig. 52—52*p*. *Processa* sp. — 52 anterior part of carapace etc. of the adult female from Stat. 193, × 20; 52*a* rostrum and anterior border of carapace of this female in a lateral view, × 33; 52*b* apex of rostrum of this specimen, looked at from above, × 66; 52*c* telson of this female, × 33; 52*d* tip of this telson, × 66; 52*e* extremity of the tip of this telson, × 200; 52*f* left external maxilliped of this female, seen from the inner side, × 13; 52*g* and 52*h* right and left leg of 1st pair of this female, × 33; 52*i* chela and part of carpus of the right second leg of this female, × 33; 52*j* rostrum of the young female from Stat. 154, × 50; 52*k* the same in a lateral view, × 50; 52*l* lower border of the pleuron of the 5th abdominal somite of this female, × 66; 52*m* telson of the female from Stat. 154, × 33; 52*n* chela and part of carpus of the left 2nd leg of this female, × 66; 52*o* chela and part of carpus of the right 2nd leg of the egg-bearing female from Stat. 96, × 66; 52*p* second leg of the young male from Stat. 4, × 66.

PLATE XVIII.

Fig. 53—53*k*. *Processa japonica* (de Haan). — 53 anterior part of carapace with the eyes etc. of the specimen from Stat. 164, × 10; the antennal scales are broken off near the base; 53*a* anterior part of carapace of this specimen, × 17; 53*b* telson of this specimen, × 10; 53*c* tip of telson of the young female from Stat. 313, × 100; 53*d* scaphocerite and antennal peduncle of this female, × 17; 53*e* right, 53*f* left leg of 1st pair of the specimen from Stat. 164, × 17; 53*g* chela and last joint of carpus of the right, 53*h* of the left second leg of the young female from Stat. 313, × 100; 53*i* pleopod of 2nd pair of the young male from Stat. 71, × 33; 53*j* stylamblys and appendix masculina of this pleopod, × 100; 53*k* tip of stylamblys of this pleopod, × 320.

Fig. 54—54*k*. *Glyphocrangon regalis* Bate. — 54 the full-grown egg-bearing female from Stat. 74, natural size; 54*a* left scaphocerite of this female, × 2; 54*b* scaphocerite of the young female from Stat. 38, × 4; 54*c* scaphocerite of the young specimen from Stat. 45, × 4; 54*d*, 54*e* and 54*f* the two last joints of the peraeopods respectively of the 3rd, 4th and 5th pair of the full-grown female from Stat. 74, × 2; 54*g* peraeopod of the 5th pair of this female, × $1^1/_2$; 54*h* and 54*i* dactylus of the 3rd pair of this female, looked at respectively from above and laterally, × 4; 54*j* and 54*k* dactylus of the 5th pair of this female, looked at respectively from above and laterally, × 4.

Fig. 55—55*b*. *Glyphocrangon regalis* Bate var.? — 55. carapace with eyes etc. of the young female from Stat. 85, × 2; 55*a* scaphocerite of this female, × $2^2/_3$; 55*b* peraeopod of 5th pair, × $1^1/_2$.

Fig. 56. *Glyphocrangon pugnax* de Man. — The larger female from Stat. 297, × $1^1/_3$.

Fig. 53-53ᵏ J. G. de Man. Fig. 54-54ᵏ, 55-55ᵇ, 56 J. F. Obbes del.

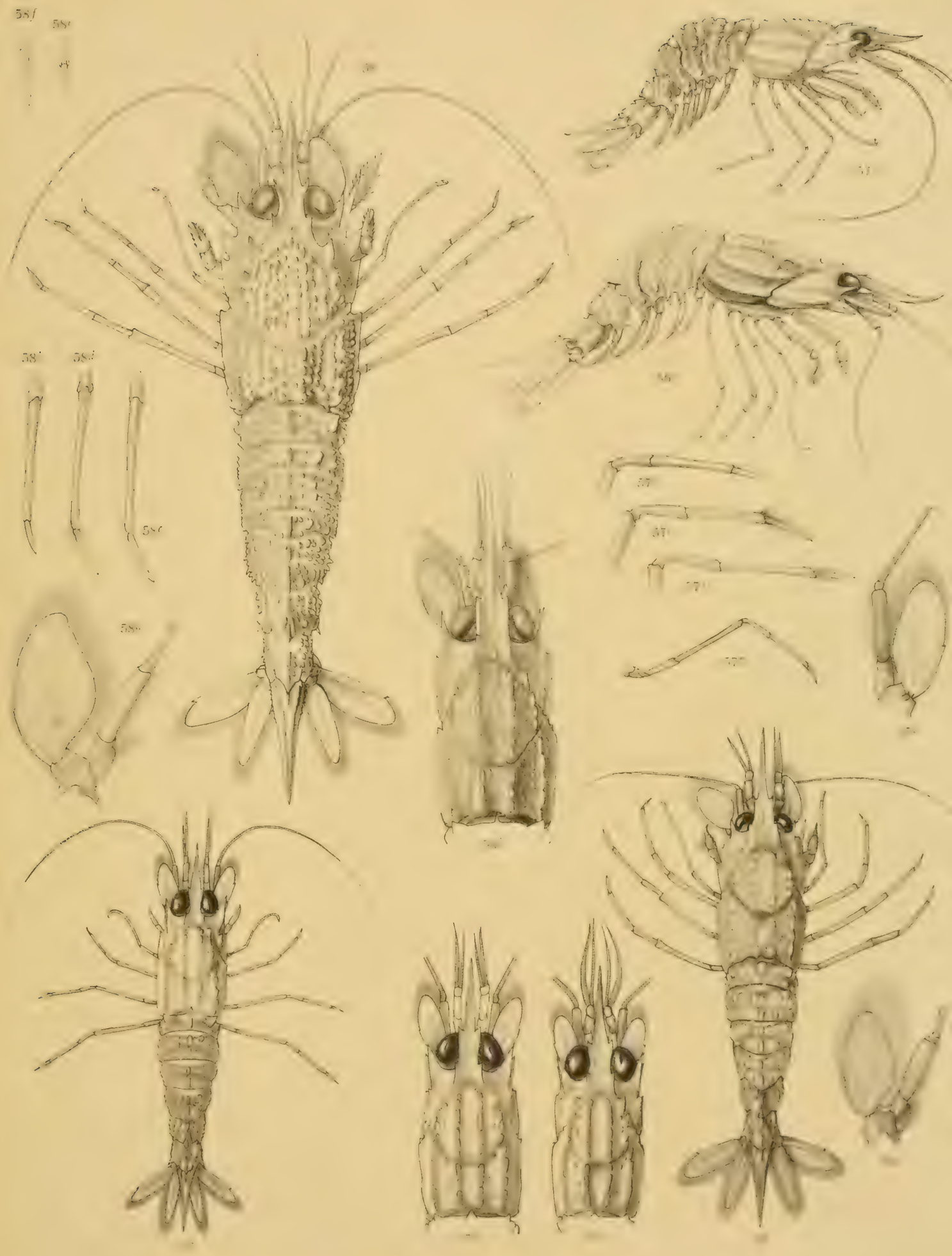
PLATE XIX.

Fig. 56*a*—56*c*. *Glyphocrangon pugnax* de Man. — 56*a* lateral view of the larger female from Stat. 297, × 1 1/3; 56*b* carapace with the eyes etc. of this female, × 2; 56*c* scaphocerite of this female, × 2 1/3.

Fig. 57—57*h*. *Glyphocrangon assimilis* de Man. — 57 the ova-bearing female from Stat. 316, × 1 1/3; 57*a* the same female in a lateral view, × 1 1/3; 57*b* carapace of this female, with the eyes, antennae and antennulae, × 2; 57*c* scaphocerite and antennal peduncle of this female, × 3 1/3; 57*d*, 57*e* and 57*f* the three last joints of the peraeopods respectively of the 3rd, 4th and 5th pair of this female, × 4; 57*g* fifth peraeopod of this female, × 2; 57*h* carapace of the larger male, × 2.

Fig. 58—58*f*. *Glyphocrangon granulosis* Bate. — 58 the full-grown ova-bearing female from Stat. 88, natural size; 58*a* scaphocerite and antennal peduncle of this female, × 2; 58*b*, 58*c* and 58*d* the two last joints of the peraeopods respectively of the 3rd, 4th and 5th pair of this female, × 2; 58*e* and 58*f* dactylus of the leg respectively of the 3rd and 5th pair of this female, looked at from above, × 2.

Fig. 59. *Glyphocrangon Sibogae* de Man. — The largest female with eggs from Stat. 45, natural size.



J. F. Obbes, del.

PLATE XXI.

Fig. 63*b*—63*v*. *Pontophilus occidentalis* Faxon var. *indica* de Man. — 63*b* carapace of the ova-bearing female, N° 4 of Table B, from Stat. 88, × 6; 63*c* the anterior and the posterior gastric tooth of this female, × 33; 63*d* carapace of an ova-bearing female from Stat. 316, × 6; 63*e* the anterior and the posterior gastric tooth of this female, × 33; 63*f* and 63*g* rostrum respectively of the ova-bearing female N° 11 and N° 12 of Table B from Stat. 316, × 17; 63*h* rostrum of the ova-bearing female, N° 2 of Table B, from Stat. 45, × 17; 63*i* scaphocerite of an ova-bearing female from Stat. 316, × 8; 63*j* anterior peraeopod of an ova-bearing female from Stat. 316, seen from below, × 2; 63*k* peraeopod of the 2nd pair of an ova-bearing female from Stat. 45, × 17; 63*l* chela of this leg, × 33; 63*m* and 63*n* the three last joints respectively of the 4th and 5th peraeopod of the same female from Stat. 45, × 6; 63*o* pleopod of 1st pair of the male from Stat. 300, × 11; 63*p* inner ramus of this appendage, × 33; 63*q* tip of this ramus, × 213; 63*r* pleopod of 2nd pair of this male, × 11; 63*s* stylamblys and appendix masculina of this pleopod, × 33; 63*t* tip of the stylamblys, × 213; 63*u* pleopod of 1st pair of the ova-bearing female, N° 11 of Table B, from Stat. 316, × 11; 63*v* pleopod of 2nd pair of this female, with 3 ova, × 11.

Fig. 64—64*e*, 64*g*—64*j*. *Pontophilus modumanuensis* Rathb. — 64 carapace of the adult female from Stat. 297, × 10; 64*a* the two gastric spines of this female, × 33; 64*b* rostrum, eyepeduncles etc. of this female, × 33; 64*c* tip of telson of this female, × 75; 64*d* scaphocerite of this female, × 10; 64*e* second peraeopod of this specimen, × 33; 64*g* rostrum, eyepeduncles etc. of the larger female from Stat. 89, × 33; 64*h* scaphocerite of this female, × 10; 64*i* carpus and subchela of this female, seen from the lower side, × 17; 64*j* second peraeopod of the same female from Stat. 89, × 33.

PLATE XXII.

Fig. 64*f*. *Pontophilus modumanuensis* Rathb. — Second pleopod of the adult female from Stat. 297, × 27.

Fig. 65—65*j*. *Pontophilus modestus* de Man. All the figures are taken from the larger specimen, excepting 65*i* and 65*j*, that are taken from the smaller. — 65 carapace with the eyes etc., × 12; 65*a* lateral view of the carapace, × 12; 65*b* rostrum, eyes etc., × 33; 65*c* tip of telson, × 100; 65*d* scaphocerite, × 20; 65*e* left subchela with carpus, × 20; 65*f* peraeopod of 4th, 65*g* of 5th pair, × 20; 65*h* pleopod of 2nd pair, × 27; 65*i* scaphocerite of the smaller specimen, × 20; 65*j* subchela with carpus of this specimen, × 20.

Fig. 66, 66*a*. *Pontophilus incisus* Kemp. — 66 rostrum, eyes etc. of the egg-laden female from Banda, × 33; 66*a* the abruptly deflexed, distal part of the rostrum, looked at from before, of the same specimen, × 33.

Fig. 67—67*g*, 67*k*, 67*n*, 67*o*. *Pontophilus angustirostris* de Man. — 67 carapace, eyes etc. of the female from Stat. 273, × 14; 67*a* the same female in a lateral view, × 14; 67*b* rostrum of this specimen, × 33; 67*c* tip of telson of the same female, × 66; 67*d* scaphocerite of this female, × 20; 67*e* peraeopod of 2nd pair of this female, × 20; 67*f* chela of this leg, × 33; 67*g* one of the setae, with which the fingers of this leg are clothed, × 100; 67*k* part of endopod with stylamblys of the pleopod of the 5th pair of the male from Stat. 50, × 100; 67*n* pleopod of the 5th pair of the female from Stat. 164, × 27; 67*o* the rudimentary endopod of this pleopod, × 100.

Fig. 63b-63f, 63h-63w, 64-64c, 64g-64j J. G. de Man, Fig. 63i J. F. Obbes. del.

PLATE XXII.

Fig. 64*f*. *Pontophilus modumanuensis* Rathb. — Second pleopod of the adult female from Stat. 297, × 27.

Fig. 65—65*j*. *Pontophilus modestus* de Man. All the figures are taken from the larger specimen, excepting 65*i* and 65*j*, that are taken from the smaller. — 65 carapace with the eyes etc., × 12; 65*a* lateral view of the carapace, × 12; 65*b* rostrum, eyes etc., × 33; 65*c* tip of telson, × 100; 65*d* scaphocerite, × 20; 65*e* left subchela with carpus, × 20; 65*f* peraeopod of 4th, 65*g* of 5th pair, × 20; 65*h* pleopod of 2nd pair, × 27; 65*i* scaphocerite of the smaller specimen, × 20; 65*j* subchela with carpus of this specimen, × 20.

Fig. 66, 66*a*. *Pontophilus incisus* Kemp. — 66 rostrum, eyes etc. of the egg-laden female from Banda, × 33; 66*a* the abruptly deflexed, distal part of the rostrum, looked at from before, of the same specimen, × 33.

Fig. 67—67*g*, 67*k*, 67*n*, 67*o*. *Pontophilus angustirostris* de Man. — 67 carapace, eyes etc. of the female from Stat. 273, × 14; 67*a* the same female in a lateral view, × 14; 67*b* rostrum of this specimen, × 33; 67*c* tip of telson of the same female, × 66; 67*d* scaphocerite of this female, × 20; 67*e* peraeopod of 2nd pair of this female, × 20; 67*f* chela of this leg, × 33; 67*g* one of the setae, with which the fingers of this leg are clothed, × 100; 67*k* part of endopod with stylamblys of the pleopod of the 5th pair of the male from Stat. 50, × 100; 67*n* pleopod of the 5th pair of the female from Stat. 164, × 27; 67*o* the rudimentary endopod of this pleopod, × 100.

J. G. de Man, del.

PLATE XXIII.

Fig. 67*h*—67*j*, 67*l*, 67*m*. *Pontophilus angustirostris* de Man. — 67*h* pleopod of 2nd pair of the male from Stat. 50, × 27; 67*i* stylamblys and the truncated appendix masculina of this pleopod, × 100; 67*j* pleopod of 5th pair of this male, × 27; 67*l* pleopod of the 2nd pair of the female from Stat. 164, × 27; 67*m* stylamblys of this pleopod, × 100.

Fig. 68—68*i*. *Pontophilus Kempii* de Man. — 68 carapace with the eyes etc. of the male from Stat. 65a, × 13; on the left side of the gastric region six of the feathered hairs are figured, with which the carapace is covered; 68*a* two hairs of the upper surface of the carapace, × 100; 68*b* rostrum of one of the two females, × 33, the stiff setae on the margins are omitted; 68*c* scaphocerite of the male, × 20; 68*d* left peraeopod of 1st pair of the male, × 13; 68*e* subchela of this leg, × 27; 68*f* pleopod of 2nd pair of the male, × 27; 68*g* stylamblys and appendix masculina of this pleopod, × 66; 68*h* pleopod of 2nd pair of the female, × 27; 68*i* endopod of this pleopod, × 66.

Fig. 69—69*c*, 69*e*, 69*g*—69*i*. *Pontophilus japonicus* Doflein. — 69 carapace and eyes of the male from Stat. 105, × 20; 69*a* rostrum of this male, × 33, the anterior margin appears asymmetrical, an individual abnormality of course; 69*b* rostrum of the female from Stat. 95, × 33; 69*c* scaphocerite of the male, × 33; 69*e* terminal part of the fingers of the 2nd peraeopod of the male from Stat. 105, × 66; 69*g* the two appendages on the inner branch of the 2nd pleopod of this male, × 66; 69*h* pleopod of 5th pair of the male, × 33; 69*i* stylamblys of this pleopod, × 66.

J. G. de Man. del.

PLATE XXIV.

Fig. 69*d*, 69*f*, 69*j*. *Pontophilus japonicus* Doflein. — 69*d* second leg of the male from Stat. 105, × 33; 69*f* pleopod of 2nd pair of the male, × 33; 69*j* inner branch with stylamblys of the pleopod of the 2nd pair of the female from Stat. 95, × 66.

Fig. 70—70*d*. *Aegeon pennata* (Bate). — 70 the ova-bearing female from Stat. 306, × 2; 70*a* the larger male from the same Station, × 2; 70*b* this male in lateral view, × 2; 70*c* left anterior leg of the ova-bearing female from Stat. 306, lower side, × 2; 70*d* second leg of this female, × 2.

Fig. 71—71*f*. *Aegeon propensalata* (Bate) var. *hilarula* de Man, type. — 71 the male from Stat. 47 looked at from above, 71*a* looked at laterally, × 2; 71*b* anterior part of carapace, × 10; 71*c* rostrum, × 33; 71*d* lateral aspect of the anterior part of carapace, × 10; 71*e* second somite of abdomen, × 10; 71*f* peraeopod of 2nd pair, × 6.

Fig. 72—72*f*. *Aegeon Sibogae* de Man. — 72 the female from Stat. 15, × 2; 72*a* lateral view of the same, × 2; 72*b* anterior part of carapace and eyes, × 6; 72*c* sternal segments of the carapace, × 2; 72*d* second and third somite of the abdomen, × 2; 72*e* right peraeopod of 1st pair, lower side, × 2; 72*f* right peraeopod of 2nd pair, × 2.

Fig. 73, 73*a*. *Aegeon Sibogae* de Man var. *intermedia* de Man. — 73 sternal segments of the carapace of the female from Stat. 302, × $2^2/_3$; 73*a* third somite of the abdomen, × $2^2/_3$.

Fig. 74*b*. *Aegeon Rathbuni* de Man. — Rostrum and eyes of the type from Stat. 89, × $6^2/_3$.

Fig. 69*d*, 69*f*, 69*f*, 71*b*-71*e* J. G. de Man, Fig. 70-70*d*, 71, 71*a*, 71*f*, 72-72*f*, 73, 73*a*, 74*a*, J. F. Obbes, del.

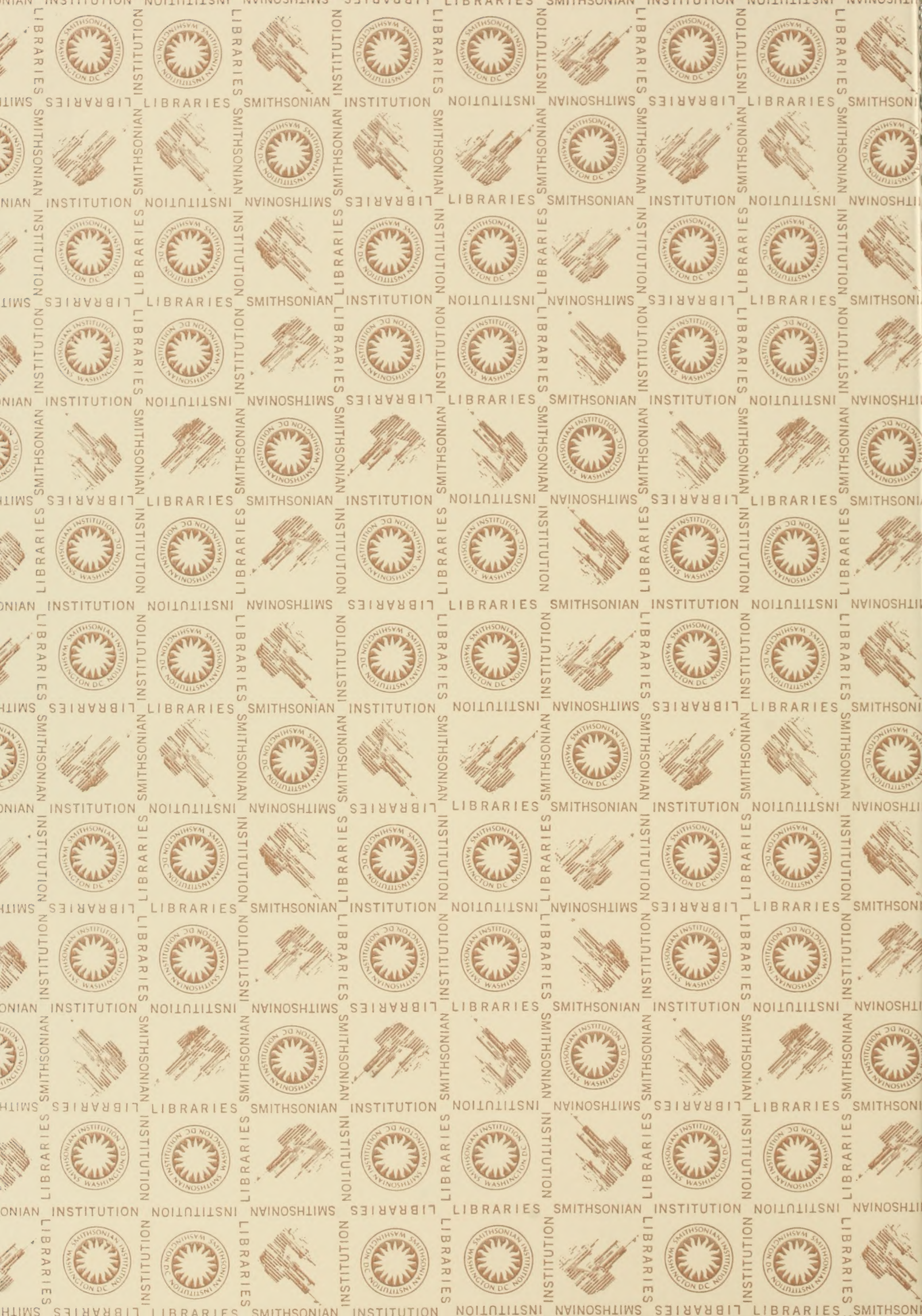
PLATE XXV.

Fig. 74, 74*a*. *Aegeon Rathbuni* de Man. — 74 the type from Stat. 89, × $2^2/_3$; 74*a* lateral view of the type, × $2^2/_3$.

Fig. 75—75*l*. *Sabinea indica* de Man, female from Stat. 65[a]. — 75 the whole type, × 4; 75*a* carapace with the eyes etc. × 6; 75*b* caudal fan, × 6; 75*c* tip of telson, × 75; 75*d* lateral view of the left leg of 1st pair, × 7; 75*e* subchela of this leg, seen from below, × 7; 75*f* peraeopod of the 2nd pair, × 17; 75*g* the two last joints of this leg, × 33; 75*h* right peraeopod of the 4th pair, × 7; 75*i* pleopod of 1st pair, × 11; 75*j* four of the long flexible hairs on the anterior part of the protopod of this pleopod, × 33; 75*k* stylamblys on the second pleopod, × 33; 75*l* one of the cincinnuli of this stylamblys, × 320.

Fig. 76—76*i*. *Prionocrangon ommatosteres* W.-Mas. — 76 carapace, with the two pairs of antennae, of the adult male from Stat. 211, × 7; 76*a* anterior part of the carapace of this male, showing the bases of the two pairs of antennae and the transformed eyepeduncles, × 17; 76*b* caudal fan of the adult female from Stat. 88 (the feathering of the hairs is not figured), × 10; 76*c* tip of telson of this female, × 50; 76*d* subchela of the left leg of 1st pair of the male, looked at from below, × 13; 76*e* the two last joints of the left leg of the 2nd pair, × 13; 76*f* the two last joints of the left leg of the 3rd pair, × 13; 76*g* the two last joints of the left leg of the 4th pair, × 13; 76*h* the two last joints of the left leg of the 5th pair, × 13; 76*i* dactylus of the left leg of the 5th pair, × 33.

Fig. 74, 74a J. F. Obbes, Fig. 75-75f, 76-76i J. G. de Man, del.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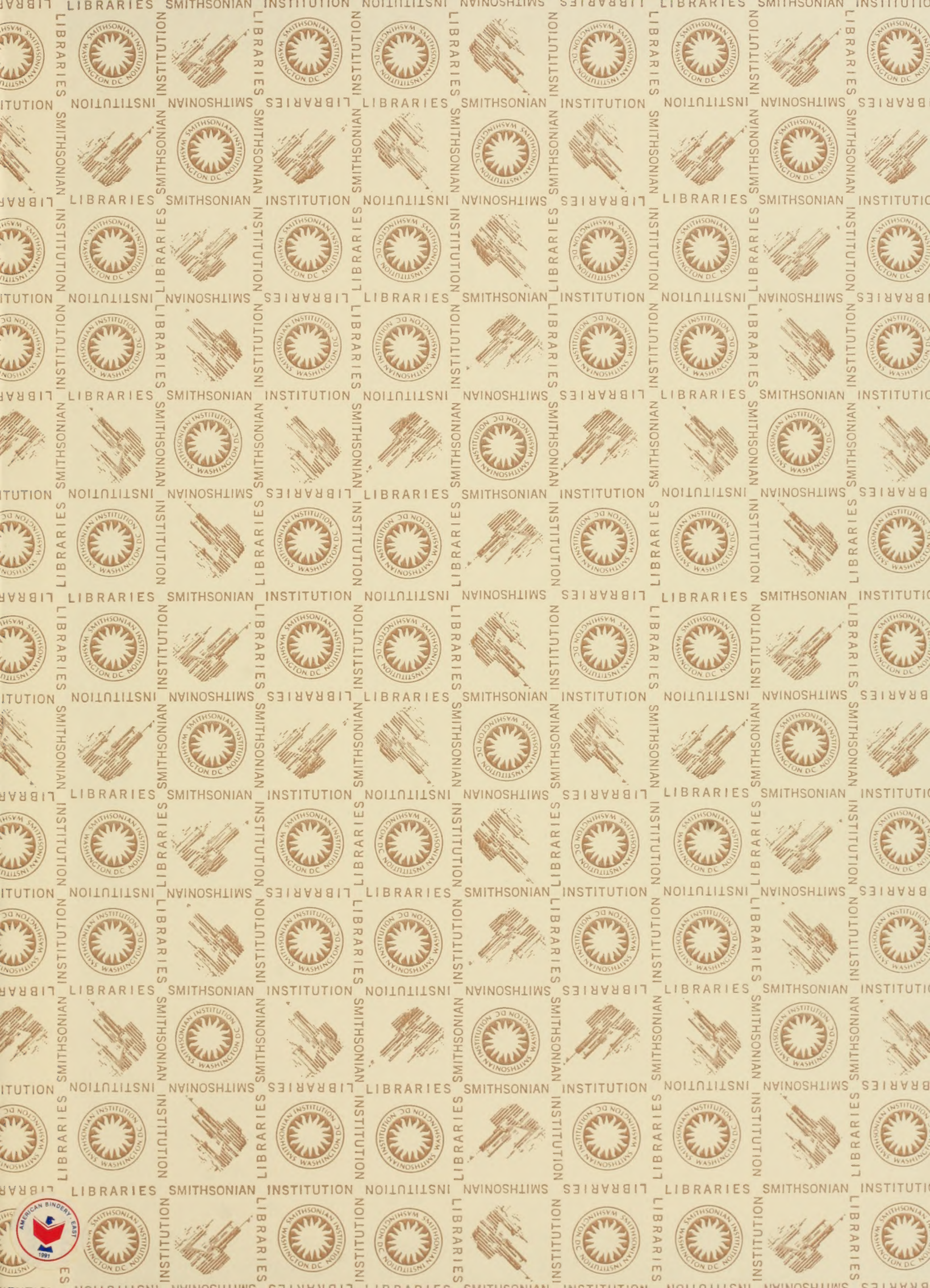
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